

1 General observations

1.1 The essence of the first chapter of the Banwell report is the problem of consultation between those within and connected with the construction industry. The Banwell committee regarded the lack of unity in the industry as one of the main reasons why it did not move forward with the speed and purpose of its most active members. While commending the efforts which had already been made at that date to achieve better co-ordination within the industry, the committee recommended that the Ministry of Public Building and Works should at an early date confer with all the interests concerned to stimulate, co-ordinate, review and publicise progressive developments in relation to contractual and managerial processes and associated ideas, and to take such action as might be necessary to achieve this end.

1.2 One of the weaknesses of the Banwell report, in our opinion, is that it did not differentiate sufficiently between 'building' and 'civil engineering'. It was, indeed, so 'building' oriented throughout that it has had less influence on the civil engineering industry than it should have done. Opinions differ as to whether the differences between 'building' and 'civil engineering' are sufficient to justify regarding—and dealing with—them in the long term as separate industries and it is not for us to pronounce upon this complex subject. But we feel we must record the fact that over and over again in our discussions we have been brought face to face with differences in the nature of the work, in the organisation and relationships of the professions and firms concerned and in the field of industrial and labour relations. Whatever may lie ahead we are convinced that for the present and for some time to come 'building' and 'civil engineering' must be treated separately. On the other hand they must be closely co-ordinated, for the simple and obvious reason that some, at any rate, of the same professions and firms are engaged in both, that some of the same skills are used and that many projects comprise both building and civil engineering.

1.3 It is against this background that we have considered the question of communications within the civil engineering industry and between it and the building industry. Broadly the industry comprises professional engineers, main contractors, specialist sub-contractors and the operatives. The organization of the various interests within these groups is complex and we think it worth while to examine this briefly.

1.4 *Professional engineers.* There are three chartered institutions covering the generic field of civil engineering, each of which is both a 'learned society' and a qualifying body. These are:

- The Institution of Civil Engineers
- The Institution of Municipal Engineers
- The Institution of Structural Engineers

Of these the Institution of Civil Engineers (ICE) is the senior and, as it covers the whole field of civil engineering, tends to take the lead in matters affecting

the profession as a whole; moreover a large proportion of the members of the other two are also corporate members of the Civils, so inevitably there is a great deal of cross-fertilization of ideas and of informal communication between them. All these are founder members of the Council of Engineering Institutions.

1.5 Corporate Members of these Institutions are engaged in all parts of the industry—as employees of central and local government and other public authorities, as private consulting engineers or in their employ and in both main and sub-contractor firms, where a significant proportion of top management are qualified engineers. It is one of the great strengths of the civil engineering industry that civil engineers who have a common basic training and qualification can and do serve in all its several parts, and that the Institution to which they belong provides a forum for examination and discussion of their common problems.

1.6 These Institutions, however, being purely learned societies cannot cater for the commercial interests of their members, nor can they engage in 'trades union' activities on their behalf. The Association of Consulting Engineers (ACE) looks after the interests of consulting engineers (civil, electrical and mechanical). The Engineers Guild and various staff associations in central and local government perform the 'trades union' function on behalf of their members.

1.7 *Main contractors.* There is one single representative organisation, the Federation of Civil Engineering Contractors (FCEC), which is concerned with the whole field of activity and interest of civil engineering contractors.

1.8 *Sub-contractors.* Sub-contractors are grouped in a number of associations such as the Federation of Piling Specialists, the British Constructional Steel Association (BCSA), the Asphalt and Coated Masonry Association and the Contractors' Plant Association. The BCSA is itself a member of the Committee of Associations of Specialists Engineering Contractors (CASEC) and other associations are constituent members of the Federation of Associations of Specialists and Sub-Contractors (FASS), whilst a number of individual firms are also members of the FCEC.

1.9 *Trades unions.* The principal trades unions concerned in civil engineering are:

- The Transport and General Workers Union
- The National Union of General & Municipal Workers
- The Amalgamated Society of Woodworkers
- The Amalgamated Union of Building Trades Workers

1.10 *Joint activities.* Whilst the need for close co-operation and communication between all these various parties and organisations set out above would seem to be obvious, in fact permanent

organizations existing for this purpose are surprisingly few. As far as we are aware they are limited to the following:

The National Consultative Council of the Building and Civil Engineering Industries (NCC) under the Chairmanship of the Minister of Public Building and Works.

The Civil Engineering Construction Conciliation Board.

The Economic Development Committee for Civil Engineering (EDCC).

The Construction Industries Research and Information Association (CIRIA).

The Construction Industry Training Board (CITB).

A number of standing committees deal with particular activities such as:

The Civil Engineering Technicians Training Scheme Committee (set up by the ICE, Institution of Municipal Engineers, ACE and FCCE).

The Civil Engineering Scholarship Trust (run by the FCCE, ICE and ACE).

The Practical Training Scheme for Young Engineers (run by the FCCE and ICE).

All other joint activities appear to be organised on an *ad hoc* basis *eg*

Joint Contracts Committee

The Joint Contracts Committee (JCC) was set up by the ICE, the ACE and the FCCE to review and, as necessary, re-draft the ICE Conditions of Contract. This committee was set up in 1965 and the present intention is to disband it when it has completed its task. Its members include civil engineers employed in central and local government.

Standard Method of Measurement Committee

This is not, in fact, a joint committee, but an *ad hoc* committee of the Institution of Civil Engineers on which care has been taken to ensure that members of the Institution representing the interests concerned are serving.

1.11 There is, in the civil engineering industry, no body corresponding to the National Joint Consultative Committee of Architects, Quantity Surveyors and Builders (NJCQ), which provides a central forum for discussion and resolution of some of the problems of the building industry: nor is there a standing committee such as the Joint Contracts Tribunal (JCT) to keep Conditions of Contract and the Standard Method of Measurement under review and give guidance on problems affecting their use. We recognise the importance of the Minister of Public Building and Works' NCC and we note the recent statements by the Minister of his intention to make it a more effective body. Nevertheless we do not think that this is an appropriate body to deal with the sort of technical and management matters which require discussion and sometimes negotiation between the parties themselves. These are matters which should be dealt with by the industry itself.

1.12 There is, of course, the EDC for Civil Engineering which appointed this working party. Here individual members of the various interests which constitute the industry meet under an independent chairman and under its aegis much useful work has been and can be done. But it is not a function of the EDC, nor is it constituted to undertake the sort of tasks we have in mind. It may identify problems in this field, but will usually need some other body to undertake their solution.

1.13 We have discussed at some length the question of whether we should recommend that the civil engineering industry should itself set up a consultative committee on the lines of the NJCC. No less than other industries, it is changing in techniques and technology and it seems probable to us that the pace of change will increase. It is therefore important that the industry's machinery should be geared to deal with new situations as they arise. Plenty of opportunity for discussions among engineers is provided by the institutions, which also give valuable guidance on a wide range of subjects, but these are learned societies and as such are not geared to act quickly over the whole field of a dynamic industry's problems. On the other hand we see a real danger in too great proliferation of consultative and advisory bodies: it is difficult to avoid overlap of functions and duplications of effort and the demands on the time of leaders of the industry to serve on all sorts of committees are already excessive.

1.14 Our conclusion is that while the time is not opportune to establish a full-scale consultative body within the industry, there is a need for a standing body in one limited field. We have already referred to the Joint Contracts Committee and to the ICE Method of Measurement Committee. The current edition of the ICE Conditions of Contract was published in 1955 and of the Standard Method of Measurement in 1953. It is already thus 13 and 15 years respectively since these were revised and for some three years, since the two committees were set up, the industry has been in a state of uncertainty, and the need for change has become more and more evident: furthermore if these committees are disbanded there will be no central body able to give guidance on problems of application or interpretation which will almost certainly arise. We believe that there is a real need for a standing committee to keep both of these documents under periodic review and also to promulgate advice on general issues arising from them. We recognise the need for contract documents to remain stable in form for a reasonable period, in the interests of the industry and its clients alike: also that interpretation of the Conditions of Contract is ultimately a matter for the courts. Nevertheless we believe that guidance on the lines of that given by the JCT to the building industry would be of great value and that changes or adaptations to meet changed circumstances will be necessary.

1.15 We therefore recommend that:

- (i) *Following the completion of the current review of the ICE Conditions of Contract and the Standard Method of Measurement, the ICE should take steps to establish the JCC on a permanent standing basis on which the interests of all the parties concerned including public authority Employers*, Engineers, Contractors and sub-contractors should be represented.*
- (ii) *The terms of reference of this Joint Contracts Standing Committee should be expanded to enable it to review and advise (both by practice notes and otherwise) on all general issues relating to the use of the General Conditions of Contract and the Standard Method of Measurement.*

*Capital letters are used throughout the report for 'Employer', 'Engineer' and 'Contractor' where these terms are used in the sense of the meaning attached to them under the ICE Conditions of Contract.

2 The team in design and construction

The importance of time

Recommendation 2a: Those who spend money on construction work seldom give enough attention at the start to defining their own requirements and preparing a programme of events for meeting them. Insufficient regard is paid to the importance of time and its proper use.

2.1 Between 90 per cent and 95 per cent of all civil engineering work is let by public bodies, many of which are very large clients such as the Central Electricity Generating Board (CEGB), the National Coal Board (NCB), British Railways and the Ministry of Transport. Where these large public clients are concerned there is no serious complaint from Contractors of lack of sufficiently defined requirements. Such criticism as we have heard is mainly directed at smaller and medium sized local authorities, many of whom, although lacking sufficient experience in particular types of construction work, nevertheless do, at times assume full responsibility for the design and management of a project without seeking specialist help.

Soil investigations

2.2 One of the main differences between building and civil engineering is that civil engineering has to contend much more with the elemental forces of nature and with the vagaries of weather, ground conditions, tides etc. This means that the successful design and execution of civil engineering work must depend very much on how skilfully and thoroughly the site conditions are investigated beforehand. *We cannot therefore emphasise too strongly that adequate site and soil investigations are an essential prerequisite not only to good design, but also to the efficient and economical execution of the works.*

2.3 This has an important practical consequence for the client. The cost of a thorough site investigation is usually only a very small fraction of the cost of the construction work but, if it is skimped, the client may be involved in heavy additional expense as a result either of the Engineer incorporating unnecessary safety margins in the design or of the work running into difficulties during construction.

2.4 Because of the crucial importance of sub-soil investigations we have no doubt at all that this work should be carried out by experts under full professional control. Soil survey specialist contractors are at present frequently selected by competitive tenders on price alone. We do not think that this always produces the best value for money. There is little scope, for reducing prices in a service of this kind, without seriously impairing the quality of the work. In this field, as in others, the client usually gets what he pays for and in this case too there is the added risk, to which we have referred, of serious increases in the cost of the subsequent construction work. *We consider therefore:*

(i) That soil investigation should be regarded as a professional service to be provided by a suitable specialist firm appointed and controlled by the Engineer.

(ii) That there should be much closer identification of the Engineer with the results of the investigation and an end to the practice of disclaiming responsibility for factual information on ground conditions made available to tenderers for the main contract.

(iii) The current ICE Conditions of Contract are not appropriate to sub-soil investigations and the Joint Contracts Committee of the ICE, ACE and FCEC should be asked to draft a new model form of contract suitable for sub-soil investigations.

2.5 Tenderers for the main contract should receive as a matter of course, a copy of the soil specialist's report and also the bore hole logs and the results of soil tests. The emphasis on professionalism needs to be underlined, and we recommend the general adoption of the following principles:

(i) The Engineer should have clear responsibility for determining the extent of the sub-soil investigation required, for approving the methods used and satisfying himself that the work has been properly carried out, and for making the final assessments of the results insofar as they affect the design and specification of the works.

(ii) To enable the Engineer to discharge the responsibilities in (i) above, the selection and appointment of the sub-soil contractor should be made by the Engineer or be subject to his agreement.

(iii) Competitive tendering based on price alone is inappropriate to sub-soil investigation and in general the normal method of appointment should be by negotiation with a single firm or with a small number of firms.

(iv) Notwithstanding the Engineer's final judgement of the results of the sub-soil specialist's work, the latter should always be required to provide full reports of the investigation, including not only the full factual data, eg bore hole logs, test results, methods, field work etc, but also his (the specialist's) interpretation of results.

(v) The Engineer should provide, or make available to tenderers for the main construction contract, the full findings by the specialist, but in so doing there should be no express disclaimer of responsibility by the Employer for the factual matter in the specialist's report.

2.6 The Ministry of Transport has recently experimented, on a major road project, with a new approach to the problem of ensuring that sufficient information about site conditions is available to the Contractor. Tenderers were selected several months before tenders were formally invited and were provided with all the available information about ground conditions. The object was to provide them with an opportunity to say whether the site and soil survey information was sufficient for their purposes, and if not, to give time for further information to be provided before tender documents were issued. The procedure was generally welcomed and consideration is being given to extending its use. *We commend this approach to other authorities in suitable cases.*

Statutory undertakers' services

2.7 A feature of civil engineering contracts is the changes which may arise when the contract is in progress. To some extent the need for this may be inevitable, being a consequence of the very nature of the work in which conditions may arise which could never have been reasonably foreseen. But, whether avoidable or not, such changes can lead to disputes and delay and generally militate against the efficient prosecution of the job. The implementation of the foregoing recommendations should help to eliminate some of the main causes of variations and we now turn to another major cause, namely, the need to deal during the course of the works with unexpected site conditions created by statutory undertakers' services. Available information as to the location—indeed the very existence of—pipes, cables, etc, is often scanty or misleading and exploratory work on the site often does not yield the full picture. In these circumstances the Contractor may encounter conditions which result in disruption of his programme and additional expense for the client. The first Lofthouse report* referred to the problems created for road construction by the existence of statutory undertakers' services, in consequence of which the Ministry of Transport brought together a technical group representative of the parties involved to study how conflicts of interest between public utilities and highway authorities would be better resolved. We understand that useful discussions have been held which are likely to improve procedures and lead to greater efficiency and accuracy in dealing with these services and we greatly welcome this and recommend the examination in addition of the possible advantages of including most of such work in major highway contracts.

2.8 There is, nevertheless, by common consent, a pressing need for a complete and accessible information in the form of fully dimensioned plans showing the location and nature of all statutory undertakers' underground installations. It is not enough for Engineers and Contractors to know that a certain service runs along a highway between two fixed points. If waste of effort and of money is to be avoided they also need to know its precise location and depth throughout its length. We recognise that it would be quite unrealistic to seek to obtain and record such detailed information about all existing services except as a very long term objective—but we do consider that full detailed information about all new main services should be recorded on plans and that this information should be readily available to all who require it. We therefore recommend that the availability and sufficiency of recorded information about the location of main underground services should be examined in the further discussions which we understand are to be held by the Ministry of Transport and the statutory undertakers concerned.

Availability of materials

2.9 Another class of information, which if provided at the pre-tender stage, can help to reduce costs and prevent delays, is information about the availability of materials and components. The use of suitable local materials may cut costs by reducing the length of haul, but the Contractor cannot always know at the time of tender, which local materials will be regarded as suitable for particular purposes.

2.10 The Lofthouse report discussed at some length the question of availability of supplies of natural

materials. Noting some of the difficulties surrounding the subject, the report recommended that, without prejudice to the Contractor's responsibilities, it should be a more general practice to inform tenderers of sources of materials which were known to be acceptable, and that the nomination of sources of material should be tried out. We understand that the Ministry of Transport are in consultation with other parties involved over some of the practical difficulties they see in this proposal.

Minor works

Recommendation 2b: 'Work of any kind, however small, should be carried out to a recognised standard'.

2.11 The Banwell Committee was primarily concerned with private house building and jobbing work when it made this recommendation.

The design team and the place of the Contractor

Recommendation 2c: 'As the complexity of construction work increases, the need to form a design team at the outset, with all those participating in the design as full members, becomes vital. Design and construction are no longer two separate fields, and there are occasions on which the main contractor should join the team at an early stage'.

2.12 There are three separate stages at which the Contractor may be brought into the design of a project; at the inception or early development of the design; during the tender period; and after the contract has been placed. Generally a Contractor is reluctant to make any serious contribution to design unless there is some prospect that he will eventually receive the contract. The fear of giving away good ideas to competitors is a powerful influence, and to enable the Contractor to contribute to design at an early stage his appointment may have to be on the basis of negotiation rather than by competitive tender. We discuss this more fully in chapter 3.

2.13 In civil engineering it is rare for Contractors to be appointed at the design stage and they can therefore put forward their ideas on design only by way of an alternative tender. Such alternative tenders are also comparatively rare in civil engineering. This is due to the many factors relating to site conditions, Employer's requirements, the requirements of other authorities* concerned, and the like, which have to be comprehensively studied and developed by the Engineer during the preliminary study and design stages. These cannot readily be deduced from examination of the original design and a Contractor might find it difficult to be sure he had incorporated them all in an alternative design. There may well be occasions when a Contractor, from his specialised knowledge, is able to prepare and offer an alternative design within the tender period, but as in most cases the Engineer's design represents a well considered and economical solution, based on careful study of various alternatives over a long period, the scope for this is limited.

2.14 Some public authorities, notably the Ministry of Transport and the CROW, do make specific provisions in their tendering procedures for the consideration of alternative designs submitted at that stage by tenderers. The objective is not so much to encourage the submission of alternative designs, the proliferation of which would only lead to a waste of

*Report of the working party under the chairmanship of Mr J A Lofthouse, on costs and productivity in road construction. The report was prepared for the CROW for Civil Engineering and published under the title *Efficiency in Road Construction* (March 1956).

source engineering skills, as to ensure that benefit is taken of any feasible alternative to the specified design which offers worthwhile advantages. It is sometimes argued that there is a widely accepted convention that if practical alternatives are offered, they are considered on their merits and that specific reference to this in the tendering arrangements is unnecessary. We consider, however, that it is preferable to ensure that tenderers having alternatives to offer know precisely how to proceed. If all know at the outset what is required, there can be no possibility of confusion or uncertainty and the integrity of the competitive tendering process is preserved. (The Ministry of Transport and the CEGM insist that all tenderers must put in an unqualified offer on the basis of the specified design, whether or not they have an alternative to propose).

2.15 It is of the essence of the procedure adopted by the Ministry of Transport and the CEGM that an alternative proposed by one tenderer is not disclosed to the other competitors. Tenderers having an alternative to propose are formally required in the case of the Ministry of Transport to notify the Engineer as early as possible during the tender period. The Engineer, after consulting the Employer where necessary, gives a preliminary view as to the acceptability of the alternative. This is not necessarily binding and if the tenderer does decide to submit an alternative it must be accompanied by sufficient information, drawings, etc to enable a full assessment of its acceptability to be made. The decision whether or not to adopt an alternative design would be determined by its overall merits, taking account not only of price and construction time but also the effect of any deferment in starting date that might arise from the adoption of the modified design. *We recommend that tender documents should always make clear at the outset whether alternative offers will be considered and, if so, that they will be treated in confidence and we consider that procedures on Ministry of Transport lines could, with benefit, be more widely adopted.*

2.16 In certain specialist fields where techniques are changing rapidly and where only the specialist is abreast of developments, we can see considerable advantage in closer involvement of the Contractor and/or the specialist sub-Contractor in the design process. Nevertheless we think that the Contractor's main contribution to economic construction in civil engineering is in discussing methods of construction with the Engineer, or what might be termed 'advance construction thinking', rather than in collaborating over basic design.

2.17 *In general, we consider that in civil engineering the scope for collaboration by Contractors in the design stage is limited and, for normal projects is unlikely to extend beyond work phasing, methods and/or minor modifications to details or specifications. Collaboration is of most benefit where the job is of exceptional size or complexity, where it is in a developing or original field, where competence in design is broadly shared between Engineer and Contractor, or where the Engineer does not have the necessary experience in the construction method contemplated.*

Professional rules

Recommendation 2b: 'Restrictions on the activities of members of the professional institutions need re-examination'.

2.18 On the Banwell committee's own testimony, its recommendation on professional rules is not directed at the civil engineering industry.

Training and site management

Recommendation 2c: 'The relationship between those responsible for design and those who actually build must be improved through common education. Much more attention should be given to the training of site agents'.

Common education and post qualification training

2.19 A tradition of common education exists for engineers in the civil engineering industry with young graduate engineers moving from the design to the construction sides and vice versa. Difficulties arise however beyond the chartered engineer level, for by that time a young engineer is trying to build himself a career and necessarily beginning to specialise in a particular field. The Council of the ICE have recently established an Education and Training Group to keep under review the post qualification education and training of engineers, and to provide a forum for these topics which should help to foster closer understanding between the various parties in the industry. To encourage post qualification training the ICE maintain an index of post graduate and refresher courses, held at universities and colleges. At present the index includes 250 regular courses and 750 short courses. *We welcome this and hope that the ICE will intensify its effort in the field of post qualification training and also consider residential courses for its members. We recommend that employers should encourage engineers to take part in them.*

2.20 Recognising the importance of the role played by technicians in the industry, in April, 1965 the Scheme for the Training of Civil Engineering Technicians was introduced jointly by the Association of Consulting Engineers, the Federation of Civil Engineering Contractors, the Institution of Civil Engineers and the Institution of Municipal Engineers. This scheme has recently been extended by the introduction of a further scheme for civil engineering higher technicians. Both these schemes specify a formal programme of practical and theoretical training and lead to recognised qualifications. Opportunities exist for trainees who do exceptionally well in their studies to transfer to training schemes leading to professional qualification. *We consider that these are excellent schemes and urge all employers in the industry to support them and to encourage their staffs to obtain the qualifications offered.*

2.21 The Banwell report placed particular emphasis on the training of site agents. We support the prominence the committee gave to this matter because of the key role which site agents play in the construction process. However the site agent in civil engineering is normally a qualified engineer, and the common background and education which he shares with the resident engineer leads to close understanding between the two despite their differing roles. We believe the quality of the site agent in civil engineering is generally satisfactory; but there is still room for improvement, particularly in management training. The FCEC sponsors for its members a series of management courses covering different levels of management, including site agents, together with such specialist courses as the Critical Path Method of Project Planning. The CITS has also recently entered the field of management training and in September 1966, jointly with the Ministry of Public

Building and Works put on their first general management course for middle management in the construction industry in conjunction with the Regent Street Polytechnic. The ceta has now initiated a

Supervisory Study Centre at Bircham Newton and courses are under way. The Banwell committee's recommendation that much more attention be given to the training of site agents is thus being pursued.

3 Appointing the contractor

3.1 In chapter three of their report the Banwell committee considered methods of appointing the Contractor. Implicit in this chapter is the principle that the desirable method of appointment depends primarily on what the client is trying to achieve. The Banwell committee identified three important factors which should be taken into account in choosing the method of appointment: (a) Efficiency of selection, *ie* appointing the most suitable Contractor for the job, obtaining value for money and ensuring economy in the tendering process. (b) The possibility, in appropriate cases, of early selection of the Contractor so that he can participate in the design and planning processes. (c) The provision, where appropriate, of continuity of work for the Contractor, aimed at producing savings in which the client should share.

3.2 There are two stages in the process of appointment which may or may not take place simultaneously: selection of the Contractor and agreement on price. The methods of appointment discussed in the Banwell report are open competition, 'selective tendering', 'two-stage procedure', 'negotiation with a single Contractor', and 'serial tendering and 'serial contracting'. We discuss the application to civil engineering of these methods—not all of which are mutually exclusive—in the paragraphs that follow.

Efficiency in selection

Open and selective tendering

Recommendation 3a: 'Open competition, though widely criticised, remains in use. Competition will play its part more effectively if there is some measure of selection before tenders are invited; and there will be occasions when competition may appropriately be limited further or even eliminated altogether.'

Recommendation 3b: 'We agree with the Simon committee and many other committees and working parties in recommending selective tendering, and our conclusion on this matter applies to small works as well as large, to civil engineering and building works alike.'

Recommendation 3c: 'Selective tendering has not been adopted as widely in the local authority field as elsewhere. Impediments should be removed, and rules for the conduct of selective tendering drawn up for the guidance of local authorities large and small.'

3.3 The case for the general adoption of selective as opposed to open tendering has been set out so often—most recently in the report of the EDC for Building Action on the Banwell Report and in the Ministry of Housing and Local Government Circular 19/67 *Local Authority Tender and Contract Procedures for Building Work*—that we do not feel called upon to say more than that we consider that the arguments in favour of its use apply equally to civil engineering as to building contracts and that we strongly recommend the adoption of selective tendering by all public authorities.

3.4 Our main concern has been to find out how far the various methods of appointment are being used and whether there has been much movement away from open tendering since publication of the Banwell report. Few private clients use open tendering. Our enquiries have therefore been confined to the public

sector, which accounts for approximately 90–95 per cent of civil engineering work. The following paragraphs describe the situation we found for the year 1966 in each of the main sectors of public civil engineering works: central government contracts; contracts let by nationalised industries; and local authority contracts for roads, water and sewerage.

Central government contracts

3.5 The Ministry of Transport as the government department responsible for the road programme has the largest volume of civil engineering works in this sector. As part of an expanding roads programme, contracts to the value of £76m were let during this period for new major trunk road and motorway construction work alone. For all its contracts, some of which are placed direct, and many by local authorities acting as agents for the Ministry, the Contractor is appointed by means of selective tendering. Other government civil engineering contracts are placed by the Ministry of Public Building and Works. The Ministry estimates that about 15 per cent of the £120m of new construction it commissions each year is civil engineering. It is mainly accounted for by dockyard and airfield construction for the Ministry of Defence and the erection of radio and TV masts for the Post Office. All these contracts are let by selective tendering.

Nationalised industries and other public bodies

3.6 C&G's civil engineering contracts amounted to about £68m excluding structural steelwork, and were mainly for power stations and transmission lines. Nearly all the contracts were placed by selective tendering; the very few exceptions were placed by

¹In selective tendering, the client invites tenders from firms who are selected for the purpose. A list may be drawn up with a particular contract in mind; this is called 'ad hoc' or 'invited list' procedure. Alternatively the client may have a standing list of approved firms from which a short list is drawn for each contract.

²The two-stage procedure is used when it is desired that the Contractor should join the design team at an early stage. The first stage consists of preliminary competition based on outline drawings in which the offers of selected firms are considered in the light of such factors as management and plant capacity, and the terms of their labour rates, prices and overheads. In the second stage the chosen Contractor works as a member of the team while details are developed and bills of quantities drawn up and at the end of this time he submits a more detailed price which if satisfactory becomes the formal contract sum.

³Negotiation of contracts can take several forms. One procedure is for the client to discuss the outline terms of the contract with a small number of firms and then finally negotiate the job with a single Contractor. Alternatively the contract may be negotiated direct with a single Contractor without preliminary competition. A special form of negotiated contract is the 'make-or-buy' where the chosen firm (selected either by preliminary competition or direct negotiation) takes responsibility for the design and construction of the scheme from beginning to end.

⁴Serial tendering is a form of standing offer whereby a Contractor undertakes to enter into a series of separate contracts in accordance with the terms and conditions of the standing offer. There is a firm commitment when the standing offer is accepted to enter into a minimum value subject to satisfactory performance. The Committee can plan the programme of work as a whole and cost advantages of securing a complete programme are reflected in tenders.

⁵Serial contracting is a contract for a single project but which, in addition, makes provision for a series of specified additional projects to be executed under the same contract. It is similar to serial tendering but the commitment is a series of projects after the first is firm, being based on a contract rather than on the acceptance of a standing offer.

negotiation, including 'package deal' contracts amounting to £8m and relating mainly to nuclear power stations. The Gas Council and Area Gas Boards handled about £3m of civil engineering work, mostly for pipe lines and storage facilities. Open tendering is not employed and most contracts are awarded by selective tender from approved lists.

3.7 The British Airports Authority had only recently taken over responsibilities for civil airport contracts from the Ministry of Public Building and Works. The Authority estimates it undertook £4½m worth of civil engineering work, mostly runways, taxiways and airport roads. All contracts are placed by means of selective tender from a standing approved list.

3.8 The British Railways' civil engineering contracts amounted to about £15m mostly for bridges, embankments, tunnels, electrification and signalling work. The majority of the contracts were placed by selective tendering but there was also a number of 'package deals' and other negotiated contracts, mostly for electrification work.

3.9 Docks and harbours are under the control of a number of different bodies, some public and some private. The largest authority is the British Transport Docks Board which placed about £6m worth of civil engineering work, mostly for jetty construction, dredging and reclamation work. All the Board's contracts are let by selective tendering from a standing approved list.

3.10 The NCB is another client of the industry and annually places about £30m worth of open cast coal contracts. All contracts are placed either by selective tendering, by negotiation (about 25 per cent of the total) or as continuation contracts.

Local authority contracts

3.11 There is little published information on the methods by which local authorities appoint contractors. With the help of the local authorities associations* we conducted a survey, which covered three activities—roads, water and sewerage—for the period 1963 to 1965. It examined the methods of appointment used by the different classes of local authority and differentiated between sizes of contract. The results are summarised below and the detailed figures are set out in Appendix I.

Roadworks

3.12 Roadworks are now the biggest sector of civil engineering. All local authorities undertake roadworks in some form or other, though for urban and rural district councils these are often only of a minor nature, *et* associated with new housing schemes. Taking all authorities together, between 1963 and 1965 there had been a change from open tendering to selective methods of appointment: the change is more pronounced when expressed in terms of value (as distinct from number) of contracts, particularly for the largest contracts. But nearly 52 per cent by value of small contracts (under £100,000) were still let by open tender. Negotiation had apparently gained in popularity especially for smaller jobs, but still accounted for a relatively small proportion of total contracts. An analysis by type of authority reveals that English and Welsh boroughs (which includes county, non-county and London boroughs) still placed a considerable volume of work by open tender—57 per cent by value of all contracts; more by number. Leading the change to selective tendering

have been the counties. Urban and rural district councils retain the highest level of open tendering. In short, while satisfactory progress has been made towards a higher proportion of selective tendering, it has not been uniform on all fronts.

Water

3.13 Many local authorities previously responsible for water schemes in their district have now handed over control to Area Water Boards. Even so, quite a substantial number of contracts are still let each year by local authorities though the average value is small. The survey revealed no clear evidence of a decline in open tendering and indeed in 1965 the figures indicate a sharp increase, though this was probably caused by the distorting effects of one or two very large contracts. The English and Welsh boroughs made greater than average use of open tendering; Scottish counties and burghs on the other hand let the bulk of their contracts by selective means and the proportions have been rising steadily. English and Welsh counties are not water authorities and neither are the majority of urban and rural district councils.

Sewerage

3.14 English and Welsh counties are not sewerage authorities but, taking all the other groups together, survey revealed that there had been a definite swing from open tendering to other forms of appointment. However, open tendering still accounted for 48 per cent by number and 32 per cent by value of all sewerage contracts in 1965. The English and Welsh boroughs, which are the main clients for sewerage schemes, have made progress in moving towards selective tendering, though mainly towards the invited list procedure rather than the standing approved list method. Rural and district councils on the other hand rely heavily on open tendering; it may be significant that few of their contracts are in the 'large category'. Scottish counties have shown an increasing use of the standing approved list procedure, but part of this has been at the expense of the invited list method. Scottish burghs show a similar trend but of special interest is the high and increasing proportion of contracts placed by negotiation, possibly due to the limited choice of Contractors in more remote districts. *We think there is room for much greater use of selective tendering in the appointment of Contractors for road, water and sewerage schemes, particularly among local authorities in England and Wales, and we strongly endorse the Ministry of Housing and Local Government's recommendations in Circular 79/67. Where standing orders of local authorities are still an obstacle we urge that they should be altered in this respect, as recommended by the Ministry of Housing and Local Government.*

Recommendation 20: 'The use of nonorthodox methods where appropriate has advantages which should not be lost to members of the public sector through rigid adherence to outdated procedures'.

3.15 We cover the subject of this recommendation in later paragraphs of this chapter, in which we discuss various nonorthodox methods of appointing the Contractor.

*Association of County Councils in Scotland
Association of Municipal Corporities
Convention of Royal Burghs of Scotland
County Councils' Association
Rural District Councils' Association
Urban District Councils' Association

Continuity of work

Recommendation 3e: 'The programming of work, carried out by means of serial tenders, offers great possibilities for continuity of employment, the development of experienced production teams, etc; and the bundling together of those who have reliable work in prospect is to be encouraged'.

3.16 The third important factor (see para 3.1 above) which the Banwell committee considered should influence the method of appointing the Contractor and the type of contractual arrangement is the desirability of continuity of work for the Contractor, and the consequent benefits for the client.

3.17 No examples of serial contracting or of serial tendering in civil engineering work have come to our notice. Contracts are sometimes negotiated with a sitting Contractor but this is a quite different arrangement. The Lofthouse report said that an experiment with serial contracting in roadwork was urgently needed and recommended the Ministry of Transport to commission a study of the subject. The Ministry subsequently commissioned consultants for this purpose and their report is now being studied. *We recommend that the Ministry make the outcome known to other employing authorities in the public sector.*

3.18 It appears to us that fixing of the price for the second and subsequent contracts of a series might well be a matter of some difficulty. In civil engineering, unlike building, no job would ever be sufficiently comparable to the first of the series for all the unit rates in the first to be applicable. Some would probably be applicable but some would always be a matter for negotiation. Even where the items of work were similar in a physical sense, such factors as the conditions in which the work was to be carried out, the material to be excavated or the haulage distance would almost certainly necessitate the negotiation of new rates.

3.19 We agree that considerable benefits should flow from greater continuity of work but we do not consider either serial tendering or contracting to be appropriate to civil engineering. However, *we recommend that authorities having continuous programmes of work should regard the provision of opportunities for Contractors to ensure continuity of work as an important factor to be taken into account when selecting firms to be invited to tender.*

Recommendation 3f: 'Construction work must be enabled to benefit from standardisation and industrialisation'.

3.20 Industrialisation is usually thought of in relation to building rather than civil engineering. The opportunity for greater standardisation and dimensional co-ordination which the adoption of the metric system presents should not be missed.

Recommendation 3g: 'Negotiated contracts need not be rightly excluded in the public field; methods of contracting should be examined for the value of the solutions they offer to problems rather than for their orthodoxy'.

3.21 One of the arrangements the Banwell committee had in mind was the early appointment of the Contractor, so that he could work as part of the team in the planning and design processes and in developing the details of the projects: the report indicated how the method of appointment used can assist this end. Early selection seems to be rarely employed in civil engineering, except where the contract is negotiated from the outset with one firm without competition. But it is not essential that competition should be dispensed with, for there are other

possibilities, including participation in design by a small number of selected firms followed by tendering; or tendering on outline designs followed by collaboration on detailed design and negotiation of price.

3.22 One of the potential advantages of negotiation, as distinct from competitive tendering, is that it may eliminate at the outset some of the possible causes of discord between client and Contractor. For this reason it tends to be resorted to where a scheme has unusual features or where it is proposed to involve the Contractor in the design process. The negotiated contract may also be used for continuation work where a scheme is being undertaken in stages. Contracts for highly specialised work such as the construction of nuclear power stations are also placed by negotiation.

Target price contracts

3.23 Another unorthodox form of contract which we have discussed is the target price contract, of which there are many variants, although the differences are only of detail. The essence of them all is that a target cost is agreed between the Contractor and the Employer. The Contractor is paid his actual costs plus a further sum agreed beforehand (which represents his profit). The amount by which the Contractor's actual costs exceed, or are less than, the target are shared between the Contractor and the Employer in pre-determined proportions (thus reducing or increasing the Contractor's profit). These proportions need not necessarily be equal; they can be fixed so as to provide the maximum incentive to the Contractor to keep costs down. Provision is made for adjusting the target in the event of variations of the work and to take account of contingencies arising which are the Employer's liability.

3.24 Accurate fixing of the target cost is crucial. If the target is fixed too high, it becomes too easy for the Contractor to 'beat the target' and increase his profit; if it is fixed too low, the excess cost may soon reduce his profit to the minimum (if one has been agreed) or extinguish it altogether, and either result in a loss to the Contractor or remove all incentive to economy. It is for this reason that it is sometimes argued that if enough is known about a project to fix the target accurately, then the specification can be drawn with sufficient precision for it to be the subject of a normal contract awarded by competitive tendering and the admittedly higher cost for the Employer of administering a target contract can be avoided.

3.25 Target price contracts may have useful applications in special circumstances, but, *in general we do not consider that they offer significant advantages for the normal run of civil engineering contracts.*

3.26 We are anxious that concepts of public accountability should not prevent the use of new forms of contract by public authorities in suitable circumstances. Clearly the public purse must be protected from corruption or fraud, but beyond that, the primary responsibility of public authorities is to secure value for money for the public to whom they are accountable. *Government departments do not normally use negotiation for civil engineering contracts. We do not think they should refrain from doing so if it can be shown there are advantages in this form of appointment for a particular contract. Each case should be judged on its merits.*

4 Some notes on procedure

Standing approved lists and invited lists

Recommendation 4a: 'The approved list should be compiled following public advertisement and contractors not included in it should be invited at intervals to apply. The conditions of entry should not be such as to discourage admission of new and growing firms. Unsatisfactory firms should be removed from the list.'

Recommendation 4b: 'Where no formal approved list is maintained, selection can be achieved by means of advertisement of the intention to invite tenders, the short list being chosen from among those applying for permission to tender.'

4.1 As there still seems to be some confusion about the operation of 'standing' and 'invited' lists we venture to offer our views on this in the civil engineering field. The Banwell committee did not express any preference as between selection from an approved standing list and selection from firms who respond to an advertisement of intention to invite tenders. The client—and it must be remembered that in civil engineering the majority of clients are public authorities—must take into account the nature and size of his programme and of the projects comprising it. An authority having annual programmes consisting of a significant number of small or medium sized schemes, but with an occasional large scheme of a more specialised nature, might maintain an approved standing list for the former, but adopt selection after advertisement for the latter. A private client with no continuous programme would not be justified in maintaining an approved standing list; for him an *ad hoc* selected list, compiled with or without advertisement would be appropriate. Whereas a large authority covering a wide range of civil engineering schemes could maintain a number of separate lists differentiating between the size and nature of schemes for which firms were considered suitable, but still resort to selection after advertisement for particular schemes of a specialised nature or exceptional size. The method adopted should be that best calculated to ensure, in the particular circumstances of the case, that tenders are received only from firms whose necessary technical and financial resources to complete the contract satisfactory in all respects have been ascertained beforehand; for this is the whole point and purpose of selective tendering.

4.2 When standing lists are maintained it is important that the factors on which the suitability of a firm will be judged should be publicly known; that all firms who are on the lists are given reasonable opportunities to tender; and that lists are kept under review to give the opportunity for new firms to be considered and unsatisfactory firms deleted or relegated to a lower category. This last feature of the procedure is of special importance. Lists must never be allowed to degenerate into something resembling exclusive clubs whose members can count on a steady flow of work as a matter of course. Firms on the lists must show, by maintaining a consistently high standard of performance, that their retention is justified; less than completely satisfactory work or

(as the Lofthouse report says) irresponsibility in making claims must quickly result in relegation to a lower category of contract or even removal from the list altogether; and the spur of competition must be maintained by the promotion to a higher category of firms showing promise and potential and by facilities for the entry of new firms who satisfy the employing authority of their competence and resources. The Ministry of Public Building and Works has published a handbook *Selective Tendering for Local Authorities* giving useful guidance on the operation of selective tendering and among other things it lists the information which firms should be asked to provide. *We strongly recommend that all concerned should adopt the criteria laid down in the Ministry of Public Building and Works handbook and state publicly that they have done so.*

4.3 With either method of selection there is still a tendency for too many firms to be invited to tender. Our survey of local authorities referred to in chapter 3 indicated that it is not uncommon for 15 or more tenders to be invited for a single job. This must involve a substantial waste of effort, the cost of which must be covered in the general level of tenders and so paid for by clients. Whilst there is no particular number of tenders which is right for each and every type of job we consider that the number now customarily obtained could be much reduced. Until the issue of the Ministry of Housing and Local Government Circular 79/67 very little guidance on this had been given, either in the Ministry of Public Building and Works handbook or elsewhere, although the Lofthouse report recommended that for major road contracts the Ministry of Transport and other highway authorities should be content to receive about four tenders for each contract. The Ministry, which had previously normally invited about eight or nine tenders now normally invites not more than six and is finding this quite satisfactory. The Lofthouse recommendation does not necessarily relate to other types of civil engineering work but we consider that it should not normally be necessary to invite more than eight tenders.

Tendering period

Recommendation 4c: 'The period allowed for the submission of tenders must be adequate for the type of project concerned.'

4.4 The Banwell report emphasises the need for sufficient time to be allocated to the tender period to enable tenderers to prepare realistic offers reflecting as accurately as possible all relevant factors. The need for this should be self-evident. But in practice most construction of any consequence requires a long period of planning and preparation, sometimes involving complex statutory procedures. It is therefore not surprising that when schemes reach the tender stage there may be strong pressure to see progress on the work at the earliest possible moment. In consequence it is often all too easy for considerations of expediency to override those of best

contract practice; strong discipline must therefore be exercised.

4.5 The Banwell committee suggested a minimum of four weeks, other than for minor works, between the date tenders are sent out and the date by which they must be returned. We think that this period is too short for most civil engineering contracts. The Ministry of Transport normally allows eight weeks for contracts of any appreciable size and ten weeks for the largest projects. If, during the tender period, there is evidence from tenderers that they are finding it difficult to complete tenders in the time allowed, the Ministry is prepared to extend the tender period still further.

4.6 In general the experience of the industry is that sufficient time is usually allowed for tendering for major contracts, but that for small schemes the time allowed is often inadequate. It is difficult to be sure why this should be so, but it might well be due, at least in part, to a mistaken impression that the difficulty of pricing a job is necessarily related to its size. In fact a quite small job may have complications which make pricing a difficult and lengthy process. We recommend that clients should allow a minimum of four weeks for tendering for normal civil engineering contracts and of six to eight weeks for large or complex schemes. The Joint Contracts Standing Committee proposed in chapter 1 should examine the question of tender periods and issue guidance notes.

Alternative offers

Recommendation 4b: 'The submission of a feasible alternative scheme by a tenderer should not be ruled out simply on the ground that to admit such an offer would cut across the principle of parity of tendering'.

4.7 We endorse this recommendation and have discussed in chapter 2, in the context of the Contractor's place in the design team, the question of alternative offers by tenderers.

Notification of results

Recommendation 4c: 'The results of competitions should be notified promptly, and all tenders should be accompanied by priced bills of quantities. Once the contract has been let, all tenderers should receive lists of the firms submitting tenders and of prices submitted'.

4.8 There are three separate points here which affect civil engineering. First, tenderers should be notified promptly whether or not they are successful. Second, once the contract is let all tenderers should be told who tendered. Third, tenderers should also be told of the prices submitted, but not necessarily of the bids by particular firms. The provision that tenders should be accompanied by priced bills, is current practice under JCC Conditions of Contract. (Under CCC/Wks/1 priced bills are called for afterwards).

4.9 Before a tender can be accepted the bills must be arithmetically checked, the rates and general make-up scrutinised and any qualifications appraised. This necessarily takes time, especially if the tender is subject to qualifications. Tenderers are obviously at a serious disadvantage if they are kept in a state of uncertainty in relation to a particular contract for an unnecessary length of time. But it would be to the disadvantage of all concerned if, in the hope of saving time, any necessary clarification of a tender was omitted and the results were to be ambiguity or uncertainty as to the precise terms of the resultant contract. Considerable time can in fact be saved if

tenderers clear points of doubt beforehand and submit unqualified tenders.

4.10 In considering the correction of errors in tenders, we discussed at some length the question of whether, in such circumstances, the tender sum or the rates in the bill of quantities should be regarded as inviolate at the tender stage. The JCC Conditions of Contract give no guidance on this. In practice we do not think that errors in tenders are a serious problem (except for the delay they cause), but nevertheless we recommend that the JCC should embody in the revised JCC Conditions of Contract a clear definition of what constitutes the tender (ie the tender sum or the rates). We also consider that there should be a greater uniformity of practice in dealing with errors in tenders and that the Joint Contracts Standing Committee proposed in chapter 1 should issue guidance on this in due course.

4.11 We are satisfied that in too many cases results of tendering are unnecessarily delayed to the disadvantage of all concerned.

We therefore recommend:

(i) That tenderers should endeavour both to clear up all points of doubt with the Engineer before tendering and to submit unqualified tenders.

(We have dealt with alternative tenders in chapter 2).

(ii) That where a point has been clarified with one tenderer all tenderers should be notified.

(iii) That tenderers not short-listed should be notified within seven days: similarly those who are short-listed should be notified within the same period.

(iv) That tenders should normally be accepted within four weeks.

4.12 As to the second and third points, namely, that the practice should be adopted of providing all tenderers with lists of the firms who have tendered and lists of tender prices, once the contract has been let. The Ministry of Transport has adopted the practice and requires its agent authorities to do the same in relation to contracts they are placing on behalf of the Ministry. The Ministry of Public Building and Works operates a similar system, but most nationalised industries do not and practice varies widely between local authorities. Among the arguments advanced against the practice have been that if the lowest tenderer were aware of the next highest tender, this would provide him with an indication of how far he could safely press claims or alternatively that it would provide gratuitous information to guide tenderers as to the level at which they should pitch their tenders for future contracts. We do not attach much importance to these arguments. There is an incentive value to firms in knowing how their tender prices compare with those of their competitors and we believe that every firm who has gone to the trouble and expense of tendering is reasonably entitled at least to be told the outcome in terms of the names of the other tenderers and the prices submitted.

We strongly endorse this Banwell recommendation, on the basis that, except in the case of the winning tender, the tender prices shall not be associated with the names of the firms concerned. We recommend its general adoption by all clients, whether public or private, and that government departments, the ACE and others in a position to do so should take positive steps to encourage this.

Recommendation 4f: 'Adequate time must be allowed between the appointment of the contractor and the commencement of work on site.'

4.13 The current ICE Conditions of Contract require the Contractor to commence the works within 14 days of the Engineer giving notice, but the conditions do not specify the period within which notice shall be given. This is often settled by arrangement between the Engineer and Contractor. There is a reasonable degree of flexibility between Engineer and Contractor over starting dates and the system appears to work satisfactorily in practice, as there is no evidence that Contractors are unduly rushed on to sites. We would emphasize that it is the date by which the contract is completed, not when it is started, which is important to the client.

Public authorities and forward budgeting

Recommendation 4f: 'Where public funds are concerned, approval to proceed should be given at the earliest possible stage, and reference back to government departments should not be required except where estimates are exceeded by a given percentage. Similarly, funds for public projects must be made available on the basis of a programme over a period of years'.

4.14 While we endorse the desire to avoid time-consuming references back which underlies the first sentence of this recommendation, we doubt whether the Benwell recommendation is sufficiently well defined or whether it would affect a significant number of projects at the present time. Public and private clients alike are making increasing use of sophisticated techniques of investment appraisal which depend upon accurate forecasting of costs. The crux of the matter is therefore accurate estimating at the preliminary design stage. Experience, unfortunately, shows that considerable changes in the estimated cost of a project do occur between preliminary estimates, final estimates and actual tender prices. This may be due largely to the uncertainties inherent in the very nature of the civil engineering work, but until it is possible to improve

the standard of estimating a client who gave approval to proceed on the basis of an estimate prepared at an early stage, as Benwell suggested, might well find his previous calculations completely invalidated when tenders were received. Public authorities cannot be expected to take irrevocable decisions on the commitment of the limited funds at their disposal until there is greater certainty than at present that the assumptions upon which they have proceeded will not be falsified by events.

4.15 We consider that the effect of uncertainty upon design teams can better be dealt with on the lines recently introduced by the Ministry of Transport for trunk road and motorway schemes, which provides for continuity of work through the preliminary design, working drawing and tendering stages. Cost and appraisal checks are applied at each stage without stopping work, whilst the decision is being made whether to proceed or not, and this decision must be given within a time-scale imposed by the design and preparation process itself. Such a procedure imposes a most useful discipline on the approving authority. We consider that this procedure could be adopted with advantage in respect of most central and local government programmes.

4.16 *We endorse the need for long-term rolling programmes for civil engineering schemes in the public sector and recommend that the EDC for Civil Engineering should urge the preparation and publication of such programmes wherever it is feasible to do so.*

Building regulations

Recommendation 4g: 'A single comprehensive code covering all the standards relating to the construction of buildings over the whole country is required, and the necessary legislation should be introduced'.

4.17 This recommendation does not apply to civil engineering.

5 Conditions of contract

Rationalisation in two stages

Recommendation 5a: 'A common form of contract for all construction work, covering England, Scotland and Wales, is both desirable and practicable. As a first step, the differences which appear in the various standard conditions for building work and civil engineering work respectively should be examined by all those concerned, including government departments, in order to produce one set of standard conditions for each. The special requirements of Scottish law or of public bodies should be met by agreed additions or alternatives rather than by separate sets of conditions. Once this has been achieved, a joint form for all construction work should be negotiated'.

5.1 A recent FCEC survey revealed that 83 per cent of all civil engineering contracts are awarded on the basis of the ICE Conditions of Contract. A further 4 per cent, mainly Ministry of Public Building and Works' Contracts, are awarded under the Government form, CCC/Wks/1. The remaining 13 per cent are mainly based on the Royal Institute of British Architects (RIBA) form, where for example a civil engineering job such as foundation work is included as part of a main building contract, or on special conditions such as the Post Office conditions of contract. Thus the ICE Conditions, modified as necessary to suit individual requirements, are by far the most commonly used form of contract in civil engineering. The almost universal use of the ICE Conditions makes them the obvious choice for the single form of contract for civil engineering that the Banwell committee recommended as a first step toward a unified set of conditions for all construction work. That is not to say that we endorse unconditionally the present ICE Conditions. Indeed a number of deficiencies have come to light over the years, and the present form is currently under review by the Joint Contracts Committee of the ICE, ACE and FCEC. We have told the JCC of a number of points we would like to see covered by their revised edition and at the same time, have urged them to complete their work as soon as possible. This is all the more urgent to avoid the production of variants of the present ICE Conditions; the more there is of this the less easy it will be to secure the general adoption of the revised standard version produced by the JCC.

5.2 We have also been in touch with the Ministry of Public Building and Works (the main users of CCC/Wks/1) on the subject of unification of contract conditions. The Ministry has explained that as most of the contracts they award are for building they have directed their attention in the first instance towards the possibility of adopting a government version of the RIBA form of contract for their building work. Discussions are in progress and the Ministry has informed us that if an RIBA (government) form is adopted for its building contracts it will then consider the adoption of a government version of the ICE Conditions of Contract for its major civil engineering works.

5.3 The second part of the Banwell committee's recommendation is that the achievement of a single

standard form for building work and another for civil engineering, should be followed by negotiations leading to a common form of contract for all construction work. In January 1966 the JCC, which is reviewing the ICE Conditions of Contract for civil engineering work, and the JCT, which is responsible for the RIBA form of contract for building work, met to discuss the Banwell committee's recommendation that there should be a common form for all construction work. Their view, which, we understand, is also the view of the constituent bodies, is that there should be single standard forms of contract for civil engineering work and for building respectively, but that the amalgamation of the two was a doctrinaire objective, the achievement of which would offer no practical advantages and would create difficulties which would outweigh any merits that might be in the proposal. Furthermore:

(i) The ICE Conditions of Contract form a basis of the International Form of Contract which is becoming increasingly adopted for use by Contractors who carry out construction work in countries other than their own. This puts UK Contractors and designers in a good position for getting overseas business, which the disappearance of the ICE Conditions would weaken.

(ii) The ICE Conditions are concerned with work which is to be the subject of re-measurement and valuation, whereas the RIBA Conditions are not.

5.4 There are, in our view, many real differences between the building and civil engineering sides of the construction industry, to some of which we have drawn attention at various points in our report. They include substantial differences in working practice and they are reflected in the existing conditions of contract commonly used for the two sectors of construction, which in particular take account of the fact that the price for one is normally a lump sum and for the other is arrived at on a measure and value basis.

5.5 We recognise that there would be difficulties in drafting a single set of conditions of contract which would be suitable for both civil engineering and building and equally applicable to a lump sum or to a measure and value contract. We are not convinced, however, that, given the will, these difficulties could not be overcome. We know that there are cases in which the RIBA form of contract has been modified to provide for remeasurement or the ICE Conditions of Contract to provide for payment of the contract price in a lump sum, also that CCC/Wks/1 is used by the Ministry of Public Building and Works for both purposes.

5.6 We think it important that minds should not be closed to the possibility that, in due course, a single document might be devised for use in both building and civil engineering. A particular benefit would be a reduction in the number of forms of sub-contract under which the same work is carried out at present, thus promoting greater efficiency and improved

relationships. The first step is clearly to agree upon one set of conditions for building and one for civil engineering. We have already noted (para 5.2) that the Ministry of Public Building and Works has been examining the possibility of adopting a government version of the NIBA form for its building work; and we recommend that as they would otherwise be the only non-conforming large public authority, the Ministry should adopt the ICE Conditions (when they are revised) for its civil engineering contracts suitably modified for government use.

Sub-contracts

Recommendation 28: 'The standardisation of sub-contract conditions should follow that of main contract conditions'.

5.7 The working party agree with this recommendation and we deal with the matter more extensively in chapter 7.

Small private works

Recommendation 29: 'Representatives of clients and builders should publicise and encourage the use of standard conditions for small private works, which lay down the rights and obligations of both sides'.

5.8 There are very few minor works let by private clients which can be classified as civil engineering and clearly the Banwell committee had the building industry primarily in mind when framing its recommendation.

Restrictive Trade Practices Act

5.9 We have discussed the effect of the 1956 Restrictive Trade Practices Act as it affects the promotion of standard forms of contract in the industry, and in particular the situation following the judgement in the Birmingham Case, where the Birmingham Federation of Building Trades Employers was held by the court to be acting against the public interest by requiring its members to press

for the use of a standard form of contract when seeking new work. We understand that the legal interpretation of the case is that under the Act organisations representing commercial interests, such as main and sub-contractor trade associations, are now prevented from recommending the use of standard forms of main contract and sub-contract by their members; but that bodies such as the ICE and the ACE, which are not trade associations, are free to recommend to their members (and through them to clients) the use of standard forms and therefore of the ICE Conditions for main contracts.

5.10 The problem really arises in the promotion of standard forms of sub-contract, for the Employer is not a party to a sub-contract and has therefore no say in the choice of conditions under which it is awarded. No agreed standard set of sub-contract conditions exists for civil engineering, but should one be produced (as we recommend in chapter 7) its adoption would be of considerable importance to sub-contractors, as it would mean they would no longer have to deal with a variety of sub-contract forms. This, among other benefits, would help to reduce the friction which can occur between Contractors and sub-contractors.

5.11 However the President of the Board of Trade has introduced amending legislation, now before Parliament, to grant temporary exemption from registration under the 1956 (Restrictive Trade Practices) Act of agreements which are of national importance. The proposals also include making provisions for an additional defence for agreements which do not materially restrict competition and widening of the Board of Trade's powers in relation to insignificant agreements. *We consider that agreed standard forms of contract are in the national interest, and it is hoped that in due course they will be given favourable consideration under the proposed procedure for exemption of agreements.*

6 Bills of quantities

Simplification of bills

Recommendation 6a: 'Bills of quantities are essential in the tendering process. Although some simplification is possible, significant progress will only take place when really adequate supporting information in the form of drawings and specifications is provided to tenderers as a matter of course. Some modifications in order to render the form of bills of quantities more convenient for builders' own purposes may also be desirable'.

6.1 The Banwell committee clearly had building and lump sum contracts in mind when framing the recommendations for this chapter. In building, where lump sum contracts are generally used, the primary function of bills of quantities is to enable a lump sum tender to be calculated; there is a subsidiary function in that the bills of quantities are used for interim valuations and adjustments to the final account. In civil engineering, however, where measure and value contracts are general, bills of quantities constitute not only the basis of tendering, but also of the measurement and valuation of work, both for interim and final certificates, and for establishing the final contract price. Since bills of quantities are used differently in lump sum and measure and value contracts, the same considerations do not necessarily apply to both forms.

6.2 We consider that in civil engineering the form of bill now generally used, although shorter than the building form, is unnecessarily detailed and that the number of items could be reduced. There seems to be a tendency to include too many items of a minor or incidental nature, often forming a very small proportion of the total contract value, which are clearly defined in the drawings and could be covered in main items. In general, there is probably more scope for simplifying and shortening the bill for works carried out above ground, than for work below ground. Earthworks and foundation works in particular can contain a high degree of unknowns for which it is desirable to retain sufficient items to provide for re-measurement and adjustment of final quantities of work completed. We would however sound a warning note. It is a basic requirement with any bill of quantities that care be taken to state in the contract documents the method of measurement adopted and to ensure that the bill is compatible with it. This is even more important with a shortened bill (which is a departure from standard practice) and applies with special force when the new method is being introduced. Failure to do these things can cause considerable difficulties in settlement of the account.

6.3 We know that simplification and shortening of bills of quantities and the use of computers for their preparation is very much in the minds of civil engineers today. We know also that the ICE has a committee engaged on revision of the Standard Method of Measurement for civil engineering quantities; that some work is in hand in government departments, among local authorities and in consulting engineers' offices on the development of computer techniques; and that, for example (under the auspices of CIRIA), research is being carried out

at Manchester University on the use of 'activity bills' in civil engineering. In a few cases shortened bills have actually been used—notably a trial by the Ministry of Transport on two contracts for motorway bridges, where bills consisted of only 40 items compared with some 300 which would have appeared in a conventional bill. These contracts are still in progress and a full assessment cannot yet be made.

6.4 What appears to us to be lacking at the present time is co-ordination of the various activities which are in progress. *We are convinced there is an urgent need to rationalize, simplify and computerize civil engineering bills of quantities and we recommend that the ICE should take the initiative in bringing together all those concerned, with a view to a co-ordinated effort being made to achieve this.*

The role of the quantity surveyor

Recommendation 6b: 'The quantity surveyor should be regarded as the "accountant" of the modern construction industry. The information gathered for the primary purpose of compiling bills of quantities is the basic material from which cost planning and analysis can develop, and none of this information should be put aside until its value for these purposes has been extracted. The proper use of cost information has a great part to play in eliminating uncertainty for the process of decision-taking in construction matters. We welcome the steps taken by the Royal Institution of Chartered Surveyors (RICS) to examine these developments and hope that they will consult others interested at an early stage'.

6.5 Quantity surveyors fulfil a somewhat different role in building and in civil engineering. In civil engineering, the Engineer carries out the responsibilities which in building are normally undertaken by the quantity surveyor and in the ICE Conditions of Contract only the Engineer is recognized in this connection. Under these conditions he is, in fact, wholly responsible for measurement, valuation and cost management. In some government departments and other public authorities quantity surveyors do undertake some, at any rate, of these functions and to a more limited extent private firms of quantity surveyors are engaged by or to work with consulting engineers. They are employed extensively by civil engineering contractors and in this respect we welcome the recent decision of the RICS to remove the restriction on their members being so employed.

6.6 Whilst we do not think that there is any need to prescribe the role of the quantity surveyor in civil engineering, we do consider that measurement, valuation and cost control (in which we include cost analysis and general statistical work) should remain the responsibility of the Engineer. These are however becoming increasingly specialist subjects and this work should be undertaken by men within the Engineer's team who have specialised in it. Whether these specialists are employees of the Engineer, or outside consultants engaged by the Engineer, or whether they are engineers or quantity surveyors (or others) with the necessary skill and expertise, is, in our opinion, unimportant provided that the requisite

skills are mobilised. The need is for people who have a sound knowledge of civil engineering and who have also specialized in these subjects.

6.7 We are not certain that the basic training of young civil engineers in these subjects is sufficiently positive to enable them to acquire the necessary expertise, nor do we believe that adequate training in the civil engineering field is provided for young quantity surveyors. In both cases it seems to be largely an acquired knowledge. We understand that the ICE is in fact reviewing such training. *We recommend that the ICE should ensure that measurement, valuation and cost control (including cost analysis and general statistical work) are adequately covered in the early training of civil engineers and that the professional bodies concerned with the training of quantity surveyors should ensure that adequate training in the civil engineering field is available to young quantity surveyors.*

6.8 The present Standard Method of Measurement for civil engineering quantities (at present under review, para 6.3) does not engender uniformity of billing. Cost data and analysis obtained from items in bills of quantities for different projects can therefore be misleading. Moreover, Contractors' methods of building-up a tender sum vary considerably from one firm to another. We understand that in some cases the sum is built-up independently of the itemizations in the bill of quantities, the latter then being used as a medium by which the total sum is broken down into individual items. Again, owing to the fact that the preliminary items provided in bills of quantities rarely provide for all the costs which fall on a Contractor at the commencement of a contract, it is a common practice for rates for work which will be executed early in the contract period to be enhanced above the true cost of work rates. Moreover, rates may be adjusted before tenders are submitted, to take account of the Contractor's policy relating to the particular contract. In practice therefore there is little correlation between the Contractor's actual costs and the prices entered against items in the bill or between bill rates quoted by different firms or for different contracts. This again militates against meaningful cost analysis from bills of quantities, as has been shown by attempts to obtain cost analysis by this means.

6.9 We recognise that the pricing of a tender and of the detailed bill of quantities comprising it is a commercial operation and that complete uniformity of practice is unlikely ever to be attainable. Nevertheless we believe that greater uniformity in the form and method of billing and greater recognition in this of the factors which influence Contractor's pricing would provide a much better basis for pricing by contractors and lead to better understanding of costs and to better estimating by all concerned.

6.10 We consider cost analysis an important aspect of civil engineering operational techniques, and one which has been neglected in the past. There are two aspects of cost analysis and of estimating which are of considerable importance both to Engineers and to their Employers. The first concerns the costs and cost estimating of elements of a structure, so that the designer may test alternative designs or elements of them in order to achieve the most economic solution for the particular structure concerned. The second concerns the cost analysis and estimating of complete schemes. The solution to these two problems may lie along different lines. For example, we understand

that some studies are in progress in the Ministry of Transport on the use of mathematical cost models for estimating the overall costs of schemes and of complete structures: these may well lead to greater accuracy in estimating for these purposes. This method may or may not be applicable to the more detailed cost information required by the designer, which may well need to be based on more detailed cost analysis. *We therefore recommend that the ICE should bring together those bodies which are studying cost analysis and estimating with the aim of developing rationalization and uniformity of billing, taking into account those factors which influence Contractors in their pricing, and of a co-ordinated effort being made by the industry as a whole.*

Welfare facilities

6.11 In addition to our terms of reference, the SOC for Civil Engineering has asked us 'to examine the possibilities of separating welfare from the competitive element in tendering'. In referring the subject to us, the SOC had in mind the need to ensure that provision of welfare facilities was not skimped in order to reduce the tender price, and therefore save money; and it felt that provision for welfare should be separated from the competitive element of tenders, possibly by providing a separate prime cost item for it in the bill of quantities.

6.12 We have considered the SOC's suggestion most carefully but we have come to the conclusion that welfare facilities cannot and should not be wholly separated from the main tender. At present the cost of welfare facilities is normally spread over the rates in the bill: exceptionally it may be entered as a separate item priced by the Contractor. We accept that it is in the interest of the Employer, as well as of Contractors and their employees, that there shall be good working and welfare conditions on civil engineering sites and that suitable provision should be made in contract documents to ensure this. In our view, however, the primary responsibility for determining standards rests with the government (through the Construction (Health and Welfare Regulations) under the Factories Acts) and with the industry and the trade unions through their negotiating machinery. Neither an individual client nor the Engineer is in a position to judge what standard of welfare facilities is appropriate to a particular project, and we therefore reject the proposal to provide a separate prime cost item in the bill of quantities.

6.13 The Construction (Health and Welfare Regulations) 1966 and the Working Rule Agreement of the Civil Engineering Construction Conciliation Board for Great Britain lay down minimum standards, but in both cases we feel they are pitched too low, are widely drawn and are capable of varying interpretations. Shortly after the SOC referred this matter to us the Conciliation Board undertook the revision of this working rule and we have drawn their attention to the need for standards to be laid down in more precise and unequivocal terms. We are convinced that if this can be done, control and enforcement could be greatly improved.

6.14 Although we rejected the provision of a prime cost item for welfare, we considered that it would strengthen control and focus attention on welfare facilities if a separate item for the provision of welfare facilities to Working Rule standard (which would be priced) were included in the bill of quantities. We brought our views to the attention of

the Standard Method of Measurement Committee of the ICE who have considered them. The committee, however, has informed us that the insertion in the bill of quantities of a separate item for welfare would cut across the principles on which they are revising the Standard Method of Measurement and could lead to contractual difficulties. Unless these objections could be overcome more harm than good might result. We believe that the essence of this problem lies in proper welfare standards being embodied in the Working Rule and in observance of Working Rule Standards being required under the ICE

Conditions (as it is and, we understand, will continue to be). We therefore feel unable to go further than again to draw the attention of the ICE and the RCTC—indeed of the industry as a whole—to the importance which we and the EDC attach to the provision of proper welfare facilities on civil engineering construction sites and to recommend that the Conciliation Board should address itself as a matter of urgency to revision of the Working Rule relative to welfare; and that welfare facilities should be provided to the requisite standards, progressively as the labour force builds up.

7 Sub-contractors

Sub-contractors and the construction team

Recommendation 7a: 'Sub-Contractors must be closely integrated into the building team from the moment they are appointed'.

7.1 The integration of the sub-contractor in the construction team is more often achieved at an early stage in civil engineering than in building, but there is still room for improvement. In civil engineering responsibility for leadership of the Contractor's team rests clearly with the main Contractor and we consider that he should play a more positive role in bringing together the sub-contractors involved at an early stage, so that maximum economy and efficiency may be achieved through closely integrated programmes and methods of work.

Nominated and non-nominated status

Recommendation 7b: 'As a general principle, the main Contractor should be responsible for the appointment of his sub-contractors, but there are occasions when nomination of sub-contractors by the client or his advisers is right. Provisional sums and prime cost sums should not be inserted in bills of quantities merely on account of incomplete knowledge of requirements'.

7.2 A nominated sub-contractor is chosen by the Engineer or the Employer (as opposed to the main Contractor) often after competition on a selective basis; nomination is resorted to for the reasons outlined in the Banwell report*. Specialists, merchants, tradesmen and others executing any work or supplying goods for which provisional or prime cost sums are included in the bill of quantities and who are nominated, selected or approved by either the Employer or the Engineer for that purpose, and others to whom under the provision of the bill of quantities or specification work is sub-let are generally known as nominated sub-contractors. There may well be scope for more nomination of sub-contractors than at present occurs in circumstances in which the Banwell report recognises that this is the right course.

7.3 In the case of direct or non-nominated sub-contractors the decision whether to employ a sub-contractor is that of the main Contractor alone, and it is his responsibility to arrange the sub-contract and price his tender accordingly.

7.4 A third method of selection of the sub-contractor is for a number of firms to be specified in the tender documents as being acceptable to the Employer and Engineer as sub-contractors, and for the main Contractor to arrange the sub-contract with any of them on his own terms. This is essentially a form of non-nominated sub-contract and no provisional or prime cost item is included in the bill of quantities.

7.5 Work may be placed with sub-contractors by the main Contractor, either to suit his own convenience at the time and keep a right balance of his own resources, or because the work is of a nature which he does not normally undertake himself—or, indeed reasons which seem to him sufficient. The choice whether nominated or non-nominated

enters into a contractual relationship with the main Contractor, and not with the Employer. However, the forms of contract used and rights of sub-contractors are different depending on whether the sub-contractor has been nominated or not.

7.6 Where the sub-contractor is not nominated, there is frequently 'multiplication' of tenders at the sub-contract level. For example, where six firms are competing for a main contract, they in turn might each invite tenders from six or seven sub-contractors. This may mean that as many as twenty or thirty sub-contractors could be invited to tender for the same job. The ratio of successful tenders to tenders submitted is a good deal lower for sub-contractors than for main Contractors and the system is clearly wasteful of skilled estimating time particularly in the specialist field.

7.7 Although nomination eliminates the multiplication of tenders and we think that there may be more scope for it, there are objections to widespread nomination for all types of sub-contract work. It would curb the main Contractor's freedom of action to sub-let any part of the main contract, lead to increased use of prime cost sums, and, most important, it would result in diffusion of the main Contractor's responsibility. The total responsibility of the main Contractor is the essence of civil engineering work.

7.8 The problem of the multiplication of tenders for non-nominated sub-contracts could largely be overcome (without the widespread use of nominated sub-contracts) by greater use of the procedure set out in para 7.4 above. A corollary of this, however, would be the drawing up by Engineers and authorities, of select lists of suitable sub-contractors over a wide field of specialisations. Such lists would be difficult to draw up and maintain and might operate unfairly against lesser known firms. Nevertheless we believe that such a procedure could be usefully employed in certain circumstances. We consider that there may be scope for wider use of nominated sub-contracts in the circumstances indicated in the Banwell report (see footnote below and that consideration should be given by the Joint Contracts Standing Committee proposed in chapter 1, to means of reducing the multiplication of tenders for sub-contracts that exists at present.

Position of the main Contractor

Recommendation 7c: 'If early nomination of a considerable proportion of the specialists involved in a project is considered necessary, then the main Contractor himself should join the team early'.

7.9 We endorse this recommendation and believe this is general practice in civil engineering.

* Banwell committee's three cases for nominating the sub-contractor (Para 7.4i)

- (1) Where certain elements of the job are fundamental to the design of the work as a whole, or where special construction techniques are involved.
- (2) Where very long planning or fabrication periods are required for certain types of equipment or components and where time-saving is an important factor.
- (3) Where maintenance and/or operating costs are important and the work must be of a certain quality.

Tendering Procedure

Recommendation 7d: 'Main Contractors should apply to the selection of sub-contractors the same standards of fairness which they expect when they themselves are chosen'.

7.10 We accept that one cannot legislate in this area, where a main Contractor should have freedom to exercise his commercial judgement. Nevertheless, there is evidence which indicates that sub-contractors do not always enjoy the same standards of fairness in selection as those which apply to main Contractors. For example, prospective main Contractors may seek prices from sub-contractors as a check to their own tendering prices and when they get the contract subject the sub-contractor to pressure for a competitive reduction in an endeavour to improve their own profit margin. This practice is generally to be deplored, particularly as it can sometimes have a serious effect on the quality of workmanship eventually arising under the sub-contract.

7.11 It is difficult to establish a workable means of overcoming this problem, other than the acceptance by Contractors of a more responsible approach to the placing of sub-contracts. We do, however recommend that for work which is likely (though not necessarily) to be placed with sub-contractors, the method described in 7.4 and 7.8, where the Engineer lists in the tender documents those sub-contractors whom he is prepared to approve, should be more freely adopted by employing authorities. It should be made clear that only in exceptional circumstances approved by the Employer would tenderers be permitted to deviate from the approved list.

Labour-only sub-contracting

Recommendation 7e: 'The approval of the architect should be required to labour-only sub-contracting as to other forms of sub-contracting'.

7.12 We did not discuss this recommendation, since the whole subject is under consideration by the Phelps-Brown committee of enquiry, set up jointly by the Minister of Public Building and Works and the Minister of Labour.

Standard forms of sub-contract

Recommendation 7f: 'At the time of invitation to tender, sub-contractors must know under what contract conditions they will be called upon to work; if nominated before appointment of the main Contractor, then the main contract must stipulate the conditions under which sub-contractors are to be employed. Standard forms of tender and sub-contract are foreseen'.

7.13 Less use is made of 'standard' contract conditions for sub-contract work in civil engineering than in building. A model form of sub-contract for work under a main contract governed by the ICE Conditions has been published by the EC&C, but does not appear to be extensively used within the industry as the sub-contractors did not take part in its preparation.

7.14 Conditions of contract for standard forms of nominated sub-contract must follow closely those of the main contract. As the ICE is at present engaged in revision of the ICE Conditions of Contract, there is little point in starting work on standard forms of sub-contract until the revision of the main contract has been completed. For the same reason, however, the decisions being taken now by the ICE could effect the negotiations for standard forms of sub-contract. We therefore wrote to the ICE asking that sub-contractors' organisations be given an opportunity to present their views on the ICE Conditions of

Contract to the ICE. This suggestion has been accepted by the ICE who have now invited F&S and CASEC to comment on the existing text from the point of view of sub-contractors' interests. We recommend, that, when the revision of the ICE Conditions has been completed, the EC&C and the appropriate sub-contractors' organisations should jointly negotiate standard forms, first for nominated sub-contracts and then for non-nominated sub-contracts.

Time for preparation

Recommendation 7g: 'Sub-contractors should not be expected to start work without a reasonable period for preparation'.

7.15 We have no evidence that the time allowed for starting sub-contract work on civil engineering projects is, in general inadequate. As far as we can judge, the recommendation by the Banwell committee is being satisfactorily implemented.

Payments

Recommendation 7h: 'We hope that architects and engineers will exercise their right in the main contractors' default to certify for direct payment when appropriate'.

7.16 Even in civil engineering, where the number of sub-contractors is less than in building, sub-contractors claim that they finance a significant part of main Contractor's operations. For example, the piling industry estimates that half the annual value of work done is outstanding at any time in the form of delayed certificate payments and retention money.

7.17 Clauses in the ICE Conditions of Contract (clauses 58 and 59) with respect to nominated sub-contractors are not entirely clear and we are aware that the ICE is reviewing these clauses especially. The main difficulties with respect to finance on nominated sub-contracts appear to arise from the following:

- (a) The retention money deducted from a nominated sub-contract often forms a higher percentage of the value of the nominated sub-contract than does the retention withheld from the main Contractor as a proportional value of the main contract. This is because, as the size of the contract increases, the amount of retention money may become a progressively reducing proportion of the contract sum.
- (b) The duration over which retention monies are held (eg retention for a sub-contract completed in the first year may be held until completion of the main contract two years later).
- (c) The main Contractor does not always pay to the nominated sub-contractor the sums due to him as promptly as they are paid by the Employer to the main Contractor.
- (d) There is considerable confusion on the entitlement to discount.

We consider that all these are important aspects which call for early resolution by the industry. Having put the appropriate Associations representing sub-contractors in touch with the ICE, we hope it will be possible for these problems to be resolved between them.

Representation of sub-contractors

Recommendation 7i: 'The organisations representing specialist sub-contractors should be granted full membership of the national consultative bodies which exist in the industry'.

7.18 We have suggested that the sub-contractors' organisations be admitted to the Joint Contracts Standing Committee proposed in chapter 1.

8 Firm price contracts

Pre-planning

Recommendation 5b: 'Schemes must be settled in their critical details before firm price, fixed period quotations are sought.'

8.1 We understand that civil engineering contractors consider that the tender documents against which they may be asked to quote firm prices are usually sufficiently detailed to enable a soundly based quotation to be given. There is one significant exception to this: the information on soil conditions from trial borings and other site investigations is not always adequately detailed, and this affects the ability of the piling contractors and others concerned with foundations and earthworks to give soundly-based quotations. We have stressed in chapter 2 the importance of thorough site investigations (recommendation 2.2), and it follows that the results of these must be made available to the Contractor at the tender stage. Variations in the method of measurement, which can be another source of uncertainty for the Contractor, is discussed in chapter 6.

Contract period

Recommendation 5b: 'Two years is not an excessive period for the duration of firm price contracts: the period during which tenders will remain open should be limited and clearly stated.'

8.2 Government policy, shared by most public authorities, is to invite tenders on a firm price basis where the proposed contract period is two years or less and the work has been thoroughly planned in advance. This has worked reasonably well in the past, contractors and their suppliers having found no insuperable difficulties in deciding what allowance, if any, to make in their prices for changes in the cost of labour, materials, transport, fuel and plant during the currency of the contract. But recent government actions and events over which contractors had no control have given rise to substantial increases in costs on existing contracts which could not reasonably have been foreseen when the tenders were prepared. These and the prospect of further unpredictable increases have led the industry to seek modifications of the present policy.

8.3 Whether under circumstances in which largely unforeseeable changes of the type referred to above occur, a period of two years is the right upper limit must depend upon judgement. If the period is so long

as to introduce an excessive degree of uncertainty, tender prices may be unnecessarily inflated; if it is too short the benefits of firm price contracts will not be attained as widely as they might be. *As we regard firm price tendering as desirable in principle, our hope would be that the difficult question of the period for which firm prices can be quoted, would be the subject of periodic review by government in consultation with the industry; and that in such reviews agreement will be reached between government and the Contractors' organisations as to the best method of allaying Contractors' legitimate concern over increases arising from unpredictable government measures, while retaining the main benefit of firm price tendering referred to above.*

Materials

Recommendation 5b: 'The nationalised industries, merchants and materials manufacturers and suppliers should quote firm prices for delivery within a reasonable period'.

8.4 The future course of material prices is often of crucial importance where firm price contracts are concerned. At present a Contractor tendering for a two-year firm price contract is unable to obtain fixed quotations for materials over a similar period. He is thus forced to gamble on future cost increases over which he has little or no control and estimates can be sometimes badly out of line. Having suffered once, the Contractor may not be keen to become committed to further firm price contracts. Firm forward prices were formerly obtainable for steel; we consider that the British Steel Corporation, in their review of pricing policy, should seriously consider the advantages for the civil engineering industry and their clients which would flow from the continuation of this practice.

8.5 Firm prices for materials depend largely on the suppliers' ability to control his costs. Prices of bulk materials used in civil engineering works are extremely sensitive to changes in fuel and transport costs. Suppliers of concrete aggregate in particular are reluctant to quote firm prices for any length of time because of possible changes in haulage rates.

8.6 We welcome the study which is being given to the question of firm prices for construction materials by the Construction Materials Group of the Economic Development Committees for Building and Civil Engineering.

9 Payments, retentions and incentives

Introduction

9.1 The Banwell committee linked payments, retentions and incentives with certain main themes which had been developed in earlier chapters; selective tendering, increased co-operation between client and Contractors, and the elimination of unnecessary impediments to rapid settlement of accounts, particularly by public authorities. If the Banwell recommendations concerning these matters are followed, the solution of difficulties in the field of payments, retentions and incentives could become easier.

Improving the money flow

Recommendation 5a: 'Valuation, certification and payments during the progress of work are sometimes slow, and these delays are commonly passed on to sub-contractors; contract conditions should be scrupulously honed. We suggested improvements which may assist the flow of money'.

9.2 The Banwell committee found that arrangements for interim payments were unsatisfactory. Payments to main Contractors were often excessively slow; and sub-contractors sometimes suffered in turn. The committee called for scrupulous adherence to the provisions of contracts governing payments and made three suggestions:

- (i) The Engineer should establish for each contract the dates of certification which suit the client best, *ie* enables him to make the payments with the minimum of delay, and should arrange for all procedures leading up to the certification of accounts to be related to that date. Contractors should prepare forecasts of the probable timing of expenditure to assist the clients' forward budgeting and thus expedite payments.
- (ii) Where a small number of items are in dispute in a certificate, payments of the undisputed items should take place at once.
- (iii) Detailed valuations are made too frequently. Periodic payments should be made on approximate assessments which can be adjusted by exact valuation at quarterly intervals.

9.3 Provision is made in the ICE Conditions of Contract for a maximum period between certification and payments; there is no requirement for the Engineer to certify within a given period from his receipt of the Contractor's valuation. This means that when the Contractor submits his valuation he cannot be certain of receiving payment within a given period.

9.4 The CECOS Conditions of Contract, however, stipulate that payment shall be made within 42 days of the Contractor submitting his valuation and we suggested to the JCC that this might be made general. We are advised that there are difficulties in attempting to incorporate an enforceable provision to this effect in the ICE Conditions of Contract but, nevertheless, *we consider it to be of the utmost importance that the contract management procedures both by Engineers and Employers should always be designed to ensure speedy certification and payment of such sums as are agreed at due.*

9.5 The main Contractor has a contractual remedy for overdue payment after certification: a five per cent rate of interest accrues to him. This however, provides no real inducement to the Employer to pay promptly as it is well below current rates of interest at which he might otherwise have to borrow. *We consider that the rate of interest on overdue payment should be more realistic and expressed as an addition to the prevailing bank rate.*

9.6 Another direction in which we found that there is room for improvement is in payments to sub-contractors. This is a field in which, in general, responsibility rests squarely on the main Contractor. The ICE Conditions of Contract appear to afford some protection for nominated sub-contractors against unjustified delay in payment by the main Contractor but the relevant provisions would benefit by re-statement in clearer form. In any case there is relatively little nominated sub-contracting in civil engineering and, for the most part, sub-contractors must rely upon the terms of their own contract with the main Contractors. We believe that, even where effective contractual remedies are at hand, sub-contractors are reluctant to apply them as they prefer to avoid the risk of jeopardising their commercial relations with important customers. Altogether, this is an area in which there appears to be considerable discontent among sub-contractors, but we think that our proposals in chapter 7 (paras 7.13, 14 and 17) should do much to eliminate the grounds for it.

9.7 The consequences of an irregular flow of payments to the Contractor can react to the disadvantage of all parties concerned with a project. We agree with Banwell that precise valuations need only be made at quarterly intervals and that for the intervening payments approximate assessments only are needed. For the latter there are many ways of estimating quickly and without undue risk to the Employer the amount of work done. Although final measurement is, and should be, a continuing process and although most Contractors require monthly measurement for their own cost control purposes, and both sides may use this as a basis for evaluating monthly progress, it is the use of detailed valuation statements that causes delay in monthly certifications.

9.8 As we have said in para 9.4 above we understand that there would be difficulty in attempting to incorporate in the ICE Conditions of Contract the CECOS stipulation of a maximum period between submission of a Contractor's interim account and payment thereof. Nevertheless, we are convinced that the mechanics of measurement and valuation need to be improved and we recommend that all employing authorities (central and local government, nationalised industries and industrial concerns) should adopt the following practice and procedure and that the ICE and ACE should recommend it to their members:

- (i) *Valuations of work done, based on measurement, should be made at quarterly intervals only.*

(ii) For intermediate payments (whether monthly or at shorter intervals) the Contractor should render his account based on approximate assessments; the Engineer should similarly assess the amount he is prepared to certify, and should certify it forthwith. Intermediate payments should be regarded as progressive and subject to adjustment only at quarterly measurement stages; and employing authorities should not require detailed justification from the Engineer for such intermediate payments.

(iii) For quarterly valuations, if some item or rate for the work done, is disputed, subject to his powers under the Conditions of Contract, the Engineer should certify the undisputed part of such item or rate as quickly as possible—reserving only the disputed part for subsequent consideration.

(iv) The period for payment after certification, inserted in the form of tender annexed to the ICE Conditions of Contract, should not exceed 14 days.

(v) On this basis the certification and payment of quarterly statements of account should be cleared in not more than 42 days and of intervening monthly accounts in not more than 21 days.

(vi) Where sections of work are clearly identifiable every effort should be made to agree final measurement of such sections, thereby speeding up the final certification of the Contract.

Public authorities etc.

Recommendation 5b: 'Public authorities and other large organisations should not permit payments due under the terms of their contracts to be delayed by administrative procedures; these should be so arranged as to permit obligations to be honoured'.

9.9 Speed of payment in civil engineering in the public sector appears on the whole to be satisfactory, but we have heard of some complaints and we urge the local authorities, nationalised industries and private clients to verify that their administrative and financial procedures are not leading to delays in payment.

Materials in off-site factories

Recommendation 5c: 'Payments for components and materials made in off-site factories present problems which merit attention by the industry itself'.

9.10 Interim payment for off-site materials is already the practice in a few areas of civil engineering work. For example, the CICA make interim payment for undelivered structural steelwork where the quantity contracted for is in excess of 5,000 tons. Special contract provision is made in these cases to cover the ownership of the material including valuations; Employers' rights of removal of material from Contractors' or suppliers' works; the insurance of material at works; and a system of identification and assessment of material due for payment.

9.11 We would like to see this practice adopted more widely in suitable cases and with suitable safeguards. It contributes to the improvement of the money flow, to which Banwell rightly attached importance; it improves the liquidity of the sub-contractor or supplier and thus strengthens his financial position particularly in circumstances in which, because the order is a large one, and the manufacturing period long, it might otherwise be strained. It reduces the pressure on the Contractor to take premature delivery of the material on the open site; and contributes to reduction of the tensions which may well arise between the parties where payment is long delayed. Clearly the key to this lies

in the introduction of a suitable clause in the Conditions of Contract, without which wider use of the practice is unlikely to develop. We recommend that the Joint Contracts Standing Committee proposed in chapter 1 should consider how provision for interim payments for off-site materials could be made in the revised ICE Conditions of Contract so that in appropriate cases suitable arrangements may be entered into between the parties concerned.

Retention moneys

Recommendation 5d: 'Where selective tendering is used, the levels of retentions prescribed in the current government conditions of contract should also be adopted in the private field. We also recommend an experiment in which tenders might be invited on alternative bases, with or without retention; the results of such an experiment should be made public'.

9.12 While the Banwell committee expressed the view that consideration should be given to the elimination of retention money when selective methods of appointment of Contractors are used, we believe that retentions perform a useful and necessary function in civil engineering and should be retained. The holding of retention money is a useful incentive to prompt completion of the work. It protects the Employer against non-compliance with the requirements of the contract in respect of maintenance. We agree that the occasions on which retention money is in fact used for these purposes are rare, but it nevertheless has a useful psychological value. We have discussed the sub-contractor's position on retention money and payments more fully in chapter 7 (paras 7.16, 7.17).

9.13 On the level of retention money to be applied, where its use is continued, Banwell recommended that 'where selective tendering is used the levels of retentions prescribed in the current government conditions of contract should also be adopted in the private field.' We found that despite this recommendation (which itself reiterated the general view expressed by a Ministry of Works' working party on retention money which reported in 1954) many employing authorities, other than the government, are still stipulating a rate of 10 per cent. We think that these authorities should review their practices with a view to adopting the Banwell recommendation, bearing well in mind that taking excessive security merely increases the Contractor's costs and so may unnecessarily raise the price to the client. We recommend that there should be general adoption of the figures used by the government departments for retention money.*

Bonds

Recommendation 5e: 'We do not recommend the general use of maintenance, performance or tender bonds'.

9.14 We agree with this recommendation.

Incentives

Recommendation 5f: 'We see no reason to oppose the use of direct bonuses; the loss of a bonus is a more effective penalty than a liquidated damages clause'.

9.15 Bonuses and other incentives for early completion of civil engineering contracts are difficult to operate owing to the likelihood of variations of the works arising during the course of the contract.

*Retention money is at the rate of 5 per cent until a reserve has accumulated in the hands of the Employer up to the following limits:
(a) where the tender sum does not exceed £50,000, 5 per cent of the tender sum but not exceeding £1,500;
(b) where the tender sum exceeds £50,000, 3 per cent of the tender sum.

Unknown factors, soil conditions, weather etc, frequently result in the completed work differing in some degree from what was originally specified and it is difficult to determine whether or not the target date has been met. Moreover, monetary incentives may increase the cost of a project and so leave an authority which is dependent on budgeting limitations less money for other equally desirable work. There may, of course, be special circumstances, particularly in the case of revenue-earning projects in the commercial field, where the cost of incentives for early completion may be well worthwhile.

9.16 As a general rule, however, the most satisfactory arrangement is for the client to stipulate clearly the completion date required and discourage late completion by stipulating a figure for liquidated damages, which adequately reflects all elements of the resultant loss (without, however, constituting a penalty). What is probably the most effective incentive to the Contractor to complete promptly is the saving in costs he can thereby achieve; and if a contract runs over time the profit margin may quickly dwindle and soon be overtaken by overheads and increases in other costs.

10 Contractors' claims

10.1 In our foregoing report we have made a number of suggestions and, if there is a common purpose behind them all, it is to encourage a spirit of mutual confidence between Contractors on the one hand and their clients—private and public—on the other. The free and frank discussions which have been a feature of our deliberations have convinced us more than ever that the spirit which our recommendations are designed to foster is essential to the successful prosecution of any contract to the mutual benefit of all the parties involved in the enterprise.

10.2 But there is a further problem which, unless it is resolved, will remain a bar to the full realisation of the benefits of mutual confidence and co-operation. It is not referred to by Beawell, but we think it to be so important that we feel obliged to mention it notwithstanding. It is the question of Contractors' claims.

10.3 Before the Second World War the incidence of formal claims on civil engineering contracts was less than it has since become mainly because the Contractor was required to (and did) accept most of the risks and Engineers exercised a fairly wide discretion in determining what the Contractor should be paid when variations occurred or unforeseen circumstances arose. In the post-war period the situation has been different for a number of reasons. Under the ICE Conditions of Contract, brought into general use in 1951, the Contractor was relieved of certain risks he had previously carried; specific provision was made for extra payment in certain eventualities; the work included in the contract was more precisely defined on drawings and in bills of quantities.

10.4 This inevitably led to a greater degree of formality in dealing with claims and hence to a change in the relationship between Engineers and Contractors. To a much greater extent than previously each is now faced with interpreting the legal entitlement of the Contractor in whatever set of unforeseen circumstances may arise. On the Engineer's side his task has not been easy, largely because of the great difficulty in drafting Contract documents which are completely unambiguous and because, when dealing with natural non-homogeneous materials, the condition of which may vary greatly, there are no absolute standards on which decisions can be based—despite considerable advances in the techniques available. On the Contractor's side, having got away from the previous all-embracing liability for risk, he naturally seeks to secure for himself extra payment for anything to which, under the contract, he appears to be entitled. This change of emphasis is, we think, a logical development arising from the increasing complexity and size of contracts, the centralisation of demand in a few larger employing authorities, and the requirements of public accountability in relation to the very large financial commitments involved.

10.5 As we have said earlier in our report, one of the fundamental characteristics of civil engineering is the extent to which it is subject to the elemental forces of nature, such as tides, earth pressures and ground conditions. An element of unpredictability or uncertainty is therefore inherent in all civil engineering contracts and this is recognised by provisions which allow variation of the works and for the Contractor to receive payment for extra costs in specified eventualities. It must be generally accepted, therefore, that contractual adjustments of price are, and must remain, a perfectly proper feature of the civil engineering scene.

10.6 Where the issue is clear-cut and the cost of the work or the effect of the circumstances can be readily evaluated, no problems arise. But all too frequently the issue is not clear-cut or the effects cannot easily be evaluated at any rate until late in the contract period. In these circumstances the Contractor often merely gives notice that he intends to make a claim; factual data are recorded; and it is not until the contract is completed (and it has sometimes been long afterwards) that detailed claims are made and can be examined. When this time arrives the Contractor's first object is to seek to establish the basis of his claim under the Conditions of Contract and to quantify it. Experience does indicate that in some cases claims are inflated and the amount finally accepted in settlement of claims is substantially less than that claimed. It was against this background that the Lofthouse report recommended the Ministry of Transport when considering a Contractor's suitability for further contracts, to regard an irresponsible attitude to claims as a factor to be taken into account. All this lowers the level of confidence between the parties, not only on the particular contract but generally as between Engineers and Employers on the one side and Contractors on the other. Some of these difficulties are, we understand, being examined by the JCC.

10.7 We are convinced that the present situation is bad for the industry and that something should be done to put these matters on a better basis. One thing which should help considerably is the revision of the ICE Conditions of Contract by the JCC as to some extent it has been ambiguities in the current and earlier versions that have given rise to the situation. But both Engineers and Contractors themselves can make a substantial contribution: Engineers by ensuring adequate soil survey, clear definition of drawing, specification and bill of quantities and full compatibility of these with each other and with the Conditions of Contract; Contractors by the early and complete formulation of claims when they do arise; and all parties, including Employers, by a responsible attitude to the spirit as well as the letter of the contract.

Conclusions and recommendations

Chapter 1 General observations

1 Following the completion of the current review of the ICE Conditions of Contract and the Standard Method of Measurement, the ICE should take steps to establish the ICE on a permanent standing basis on which the interests of all the parties including public authority employers, engineers, contractors and sub-contractors should be represented. (para 1.15).

2 The terms of reference of this Joint Contracts Standing Committee should be expanded to enable it to review and advise (both by practice notes and otherwise) on all general issues relating to the use of the General Conditions of Contract and the Standard Method of Measurement. (para 1.15).

Chapter 2 The team in design and construction

3 Adequate site and soil investigations are an essential prerequisite to good design, and the efficient and economic execution of works. (para 2.2).

4 (i) That soil investigation should be regarded as a professional service to be provided by a suitable specialist firm appointed and controlled by the Engineer.

(ii) That there should be much closer identification of the Engineer with the results of the investigation and an end to the practice of disclaiming responsibility for factual information on ground conditions made available to tenderers for the main contract.

(iii) The current ICE Conditions of Contract are not appropriate to sub-soil investigations and the Joint Contracts Committee of the ICE, ACE and FESC should be asked to draft a new model form of contract suitable for sub-soil investigation. (para 2.4).

5 Adoption of the following principles is recommended:

(i) The Engineer should have clear responsibility for determining the extent of the sub-soil investigation required, for approving the methods used and satisfying himself that the work has been properly carried out, and for making the final assessments of the results insofar as they affect the design and specification of the works.

(ii) To enable the Engineer to discharge the responsibilities in (i) above, the selection and appointment of the sub-soil contractor should be made by the Engineer or be subject to his agreement.

(iii) Competitive tendering based on price alone is inappropriate to sub-soil investigation work and in general the normal method of appointment should be by negotiation with a single firm or with a small number of firms.

(iv) Notwithstanding the Engineer's final judgement of the results of the sub-soil specialist's work, the latter should always be required to provide full reports of the investigation, including not only the full factual data, for example bore hole logs, test results, methods, field work, but also his (the specialist's) interpretation of results.

(v) The Engineer should provide, or make available

to tenderers for the main construction contract, the full findings by the specialist, but in doing so there should be no express disclaimer of responsibility by the Employer for the factual matter in the specialist's report. (para 2.5).

6 The availability and sufficiency of recorded information about the location of main underground services should be examined by the Ministry of Transport and the statutory undertakers concerned. (para 2.6).

7 Tender documents should always make clear at the outset whether alternative offers will be considered and, if so, that they will be treated in confidence. Procedures on Ministry of Transport lines could, with benefit, be more widely adopted. (para 2.15).

8 In general, in civil engineering the scope for collaboration by Contractors in the design stage is limited and, for normal projects is unlikely to extend beyond work phasing, methods and/or, minor modifications to details or specifications. Collaboration is of most benefit where the job is of exceptional size or complexity; in a developing or original field where competence in design is broadly shared between Engineer and Contractor, or where the Engineer does not have the necessary experience in the construction method contemplated. (para 2.17).

9 The action of the ICE in maintaining an index of post-graduate and refresher courses is welcomed, but the Institution is recommended to intensify its effort in the field of post qualification training and also to consider the establishment of residential courses for its members. Employers should encourage engineers to take part in such courses. (para 2.19).

10 Employers in the civil engineering industry should support and encourage schemes provided for training technicians. (para 2.20).

Chapter 3 Appointing the contractor

11 The adoption of selective tendering by all public authorities is strongly recommended. (para 3.4).

12 There is room for much greater use of selective tendering in the appointment of Contractors for road, water and sewerage schemes, particularly among local authorities in England and Wales, and the Ministry of Housing and Local Government's recommendations in Circular 79/67 are strongly endorsed. Where standing orders of local authorities are still an obstacle they should be altered in this respect as recommended by the Ministry of Housing and Local Government. (para 3.15).

13 The outcome of the report commissioned by the Ministry of Transport to examine the feasibility of serial contracting for road construction work should be made known to other employing authorities in the public sector. (para 3.18).

14 Authorities having continuous programmes of work should regard the provision of opportunities for Contractors to secure continuity of work as an important factor to be taken into account when

selecting firms to be invited to tender. (para 3.20).

15 Target price contracts do not in general offer significant advantages for the normal run of civil engineering contracts. (para 3.26).

16 Government departments should not refrain from using negotiation for civil engineering contracts if it can be shown that there are advantages in this form of appointment for a particular contract. Each case should be judged on its merits. (para 3.27).

Chapter 4 Some notes on procedure

17 All authorities using approved or invited lists should adopt the criteria laid down in the Ministry of Public Building and Works handbook *Selective Tendering for Local Authorities* and state publicly that they have done so. (para 4.2).

18 It should not normally be necessary for any client to invite more than eight tenders for civil engineering contracts. (para 4.3).

19 Clients should allow a minimum of four weeks for tendering for normal civil engineering contracts and six to eight weeks for large or complex schemes. The proposed Joint Contracts Standing Committee should examine the question of tender periods and issue guidance notes. (para 4.5).

20 The JCC should embody in the revised ICE Conditions of Contract a clear definition of what constitutes the tender (i.e. the tender sum or the rates). There should also be greater uniformity of practice in dealing with errors in tenders and the proposed Joint Contracts Standing Committee should issue guidance on this in due course. (para 4.10).

21 In many cases results of tendering are unnecessarily delayed to the disadvantage of all concerned. This situation could be improved by adopting the following principles:

(i) Tenderers should endeavour both to clear up all points of doubt with the Engineer before tendering and to submit unqualified tenders.

(ii) Where a point has been clarified with one tenderer all tenderers should be notified.

(iii) Tenderers not short-listed should be notified within seven days; similarly those who are short-listed should be notified within the same period.

(iv) Tenders should normally be accepted within four weeks. (para 4.11).

22 Once the contract has been let tenderers should be provided with a list of all tenderers and a list of tender prices on the basis that, except in the case of the winning tender, the tender prices shall not be associated with the names of the firms concerned. This principle should be adopted by all clients, whether public or private and government departments, the Association of Consulting Engineers and others in a position to do so should take positive steps to encourage this. (para 4.12).

23 The E.C.C. for Civil Engineering should urge the preparation and publication of long term rolling programmes for civil engineering schemes in the public sector wherever it is feasible to do so. (para 4.16).

Chapter 5 Conditions of Contract

24 As they would otherwise be the only non-conforming large public authority, the Ministry of Public Building and Works should, for its civil engineering contracts, adopt the ICE Conditions of Contract suitably modified for government use. (para 5.6).

25 Agreed standard forms of contract are in the 26

national interest, and it is hoped that in due course, they will be given favourable consideration under the proposed procedure for exemption of agreements. (para 5.11).

Chapter 6 Bills of quantities

26 There is an urgent need to rationalise, simplify and computerise civil engineering bills of quantities and the ICE should take the initiative in bringing together all those concerned, with a view to a co-ordinated effort being made to achieve this. (para 6.4).

27 The ICE should ensure that measurement, valuation and cost control (including cost analysis and general statistical work) are adequately covered in the early training of civil engineers and that the professional bodies concerned with the training of quantity surveyors should ensure that adequate training in the civil engineering field is available to young quantity surveyors. (para 6.7).

28 The ICE should bring together those bodies which are studying cost analysis and estimating with the aim of developing rationalisation and uniformity of billing, taking into account those factors which influence contractors in their pricing and of a co-ordinated effort being made for the industry as a whole. (para 6.10).

29 The Civil Engineering Construction Conciliation Board should address itself as a matter of urgency to the revision of the Working Rule relative to standards of welfare. (para 6.14).

30 Welfare facilities should be provided to the requisite standards, progressively as the labour force builds up. (para 6.14).

Chapter 7 Sub-contractors

31 Main Contractors should play a more positive role in bringing together the sub-contractors involved at an early stage, so that maximum economy and efficiency may be achieved through closely integrated programmes and methods of work. (para 7.1).

32 There may be scope for wider use of nominated sub-contracts in the cases indicated in the Banwell report. Consideration should also be given by the proposed Joint Contracts Standing Committee to means of reducing the multiplication of tenders for sub-contracts which exists at present. (para 7.8).

33 On completion of the revision of the ICE Conditions of Contract the JCC and the appropriate sub-contractors' organisations should jointly negotiate standard forms, first for nominated sub-contracts and then for non-nominated sub-contracts. (para 7.14).

Chapter 8 Firm price contracts

34 Firm price tendering is desirable in principle, but the difficult question of the period for which firm prices can be quoted should be the subject of periodic review by government in consultation with the industry; and that in such reviews agreement will be reached between government and the contractors' organisations as to the best method of allaying contractors legitimate concern over increases arising from unpredictable government measures, while retaining the main benefit of firm price tendering. (para 8.3).

35 The study which is being given to the question of firm prices for construction materials by the Construction Materials Group of the Economic Development Committee for Building and Civil Engineering is welcomed. (para 8.6).

Chapter 9 Payments, retentions and incentives

36 It is of the utmost importance that the contract management procedures adopted both by Engineers and Employers should always be designed to ensure speedy certification and payment of such sums as are agreed to be due. (para 9.4).

37 The rate of interest on overdue payment should be more realistic and expressed as an addition to the prevailing bank rate. (para 9.5).

38 The mechanics of measurement and valuation of certificates need to be improved. Employing authorities (central and local government, nationalised industries and industrial concerns) should adopt the following practice and procedure and the ICE and AICE should recommend them to their members.

(i) Valuation of work done based on measurement, should be made at quarterly intervals only.

(ii) For intermediate payments (whether monthly or at shorter intervals) the Contractor should render his account based on approximate assessments; the Engineer should similarly assess the amount he is prepared to certify, and should certify it forthwith. Intermediate payments should be regarded as progressive and subject to adjustment only at quarterly measurement stages. Employing authorities should not require detailed justification from the Engineer for such intermediate payments.

(iii) For quarterly valuations, if some item or rate of the work done, is disputed, subject to his powers under the Conditions of Contract, the Engineer should certify the undisputed part of such item or rate as quickly as possible—reserving only the disputed part for subsequent consideration.

(iv) The period for payment after certification, inserted in the form of tender annexed to the ICE Conditions of Contract, should not exceed 14 days.

(v) On this basis the certification and payment of quarterly statements of account should be cleared in not more than 42 days and of intervening monthly accounts in not more than 21 days.

(vi) Where sections of work are clearly identifiable every effort should be made to agree final measurement of such sections thereby speeding up the final certification of the Contract. (para 9.8).

39 Local authorities, nationalised industries and private clients should verify that their administrative and financial procedures are not leading to delays in payment. (para 9.9).

40 The proposed Joint Contracts Standing Committee should consider how provision for interim payments for off-site materials could be made in the revised ICE Conditions of Contract so that in appropriate cases suitable arrangements may be entered into between the parties concerned. (para 9.11).

41 The scale of retention money used in Government contracts should be generally adopted. (para 9.13).

Chapter 10 Contractors' claims

42 The present situation with regard to the formulation and settlement of claims is a bar to full realisation of the benefits of mutual confidence and co-operation in the industry. A new approach by all parties—Employers, Engineers and Contractors—is required. (para 10.7).

Appendix 1

Local authorities' methods of appointing contractors for civil engineering works

Table 1 Road-works

<i>Method of appointment</i>	<i>Number of schemes</i>			<i>Value of schemes</i>		
	1963	1964	1965	1963	1964	1965
Open tender	73.0	70.1	58.3	68.2	32.6	14.4
Invited list	9.9	9.4	12.6	24.6	27.6	17.7
Select list	14.6	16.9	24.4	6.1	38.4	64.4
2-stage procedure	0.4	—	0.9	0.1	—	0.3
Negotiated contract	2.1	3.6	3.8	0.9	1.3	3.3
Total	100	100	100	100	100	100
Sample size (number/value)	307	555	533	£34.5m	£49.9m	£34.9m

Table 2 Water schemes

<i>Method of appointment</i>	<i>Number of schemes</i>			<i>Value of schemes</i>		
	1963	1964	1965	1963	1964	1965
Open tender	34.9	35.2	33.2	42.3	42.5	58.8
Invited list	26.0	30.0	16.2	10.6	37.0	16.2
Select list	31.3	29.2	38.9	33.6	19.0	22.3
2-stage procedure	—	—	—	—	—	—
Negotiated contract	7.8	5.6	11.7	13.5	1.4	2.7
Total	100	100	100	100	100	100
Sample size (number/value)	281	267	265	£6.7m	£6.7m	£7.1m

Table 3 Sewerage schemes

<i>Method of appointment</i>	<i>Number of schemes</i>			<i>Value of schemes</i>		
	1963	1964	1965	1963	1964	1965
Open tender	64.6	59.0	47.9	70.7	58.5	32.0
Invited list	19.8	20.8	23.3	18.3	28.2	41.6
Select list	10.1	12.5	16.7	9.0	7.4	22.6
2-stage procedure	0.7	0.3	1.3	0.1	4.4	0.2
Negotiated contract	4.9	7.3	10.7	1.8	1.4	3.7
Total	100	100	100	100	100	100
Sample size (number/value)	268	288	317	£10.4m	£11.8m	£12.9m

Source: NEDO Survey

Appendix 2

A glossary of trade associations and other main bodies referred to in the text

ACE

The Association of Consulting Engineers was formed in 1912 with the object of promoting the advancement of the profession of consulting engineering by associating together for co-operation and mutual consultation those engineers whose work is of a purely consultative character. It provides a means by which governments, public and other bodies can confer with consulting engineers as a professional group and obtain their views. It does not encroach on the functions of the professional engineering institutions but confines its attention to matters affecting the status, professional conduct, emolument and general interests of consulting engineers, who form only a small proportion of the membership of the professional institutions. It is also the medium through which the public can obtain information or assistance in connection with the profession. The association has 816 members representing 70 individual Consultants and 365 firms of Consulting Engineers.

CASEC

The Committee of Associations of Specialist Engineering Contractors was formed in 1961 to deal with matters of common interest to industries engaged on specialist engineering work. It has four member associations namely:

- The British Constructional Steelwork Association
- The Electrical Contractors' Association
- The Electrical Contractors' Association of Scotland
- The Heating and Ventilating Contractors' Association

FASS

The Federation of Associations of Specialists and Sub-Contractors was founded in 1943 from the former National Federation of Specialists and Sub-Contractors. The present membership consists of 25 associations. There is also an autonomous Scottish Board. The Federation's function is to deal with questions affecting the common interest of the members of its constituent associations and to concert common policies and action on them. It is not concerned with technical matters nor, except upon request, with matters affecting any one association individually. Among its members are the following associations:

- The Architectural Metal Craftsmen's Association
- The Association of Constructional Floor Specialists
- The Association of Flooring Contractors
- The British Precast Concrete Federation
- The Concrete Reinforcement Steel Association
- The Federation of Painting Contractors

- The Federation of Piling Specialists
- The Felt Roofing Contractors Advisory Board
- The Flat Glass Association
- The Floor Covering Contractors Association
- The Mastic Asphalt Employers Federation
- The Metal Fixing Association for Building Insulation
- The Metal Window Association Ltd
- The National Association of Lift Makers
- The National Association of Shopfitters
- The National Federation of Demolition Contractors
- The National Federation of Master Painters and Decorators of England and Wales
- The National Federation of Master Steeplejacks and Lightning Conductor Engineers
- The National Federation of Plumbers and Domestic Heating Engineers (Employers)
- The National Federation of Roofing Contractors
- The National Federation of Terrazzo Mosaic Specialists
- The National Master Tile Fixers Association
- The Patent Glazing Conference
- The School Furniture Manufacturers' Association Ltd
- The Society of Railing and Balustrade Makers

FCEC

The Federation of Civil Engineering Contractors was formed in 1919 and is the central organisation of employers in the Civil Engineering Industry. The Federation is a federal organisation composed of eight regional sections and a general section. The Federation is the recognised channel for consultation with the Civil Engineering Contracting Industry and the recognised spokesman for the industry. Its two main functions are labour negotiations and conditions of contract and in addition it acts as a liaison and negotiating body with the Government. The federation also works closely with the professional bodies in the industry with particular regard to training.

ICE

The Institution of Civil Engineers was founded in 1818 and at 31 January 1968 had a total membership of 38,602 made up of honorary members, members, associate members, associate graduates and students. The terms of reference under Royal Charter provide that it shall be an institution:
'For the General Advancement of Mechanical Science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a Civil Engineer; being the art of directing the Great Sources of Power in Nature for the use and convenience of man, as the means of

production and of traffic in States both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks for internal intercourse and exchange; and in the construction of ports, harbours, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce; and in the construction and adaption of machinery; and in the drainage of cities and towns'.

JCC

The Joint Contracts Committee is a joint committee of the Institution of Civil Engineers, the Association of Consulting Engineers and the Federation of Civil Engineering Contractors. Its terms of reference are: 'To review the fourth edition of the ICE Conditions of Contract with a view to removing all major ambiguities'.

The current review commenced in December 1965.

NCC

The National Consultative Council of the Building and Civil Engineering Industries is chaired by the Minister of Public Building and Works and was set up in 1944. Its terms of reference are:

'To consider and advise the Minister of Public Building and Works on matters affecting the building and civil engineering industries, other than those normally handled by joint organisations of employers and operatives in the industries in connection with wages and conditions of employment'.

The Council's members include the following bodies:

- The National Federation of Building Trades Employers
- The Federation of Civil Engineering Contractors
- The Association of Consulting Engineers
- The Royal Institute of British Architects

- The Royal Institution of Chartered Surveyors
- The Institution of Civil Engineers
- The Scottish National Building Trades Federation (Employers)
- The National Federation of Building Trades Operatives
- The Civil Engineering Contractors Conciliation Board

The Federation of Registered House Builders

The Ministry of Public Building and Works also holds regular meetings with the Advisory Committee of Specialists and Sub-Contractors (composed of representatives of FASS) and with the Executive Committee of the National Council of Building Materials Producers.

SMM

The Standard Method of Measurement Committee of the Institution of Civil Engineers is composed of the following bodies who appointed representatives to the committee at the invitation of the Council of the Institution:

- Association of Consulting Engineers
- British Railways
- Central Electricity Generating Board
- County Surveyors' Society
- Federation of Civil Engineering Contractors
- Institution of Municipal Engineers
- Institution of Structural Engineers
- Ministry of Public Building and Works
- Ministry of Transport
- Port of London Authority

The Committee commenced its work in November 1964 with the following terms of reference: 'To review the ICE Standard Method of Measurement of Civil Engineering Quantities in relation to modern practice'.



Appendix 3

Members of the working party

<i>Chairman</i>	
W G Harris CB	Director General, Highways, Ministry of Transport
N Borg	City Engineer and Surveyor, Birmingham Corporation
S Emm MBE	Deputy Director, Contracts, Ministry of Transport
D V Gaultier	Director, Federation of Civil Engineering Contractors
A Goldstein	Partner, R Travers Morgan & Partners Consulting Engineers
W A Fitzherbert	Civil Engineer, Central Electricity Generating Board
G W Masters	Director, Tossie Bridge & Engineering Ltd
G M P Myers	National Economic Development Office
Col. A Noble CB DSO	Deputy Chairman and Joint Managing Director, W & C Freoch Ltd
D F Rees	Chairman, William F Rees Ltd
J C Third	John Mowlem & Co Ltd
C E D Wooster	Director of Building Management, Ministry of Public Building and Works
<i>Secretary</i>	
A W Flockhart	National Economic Development Office

CONTRACTING IN CIVIL ENGINEERING SINCE BANWELL

A survey of the implementation of the recommendations of the committee under the chairmanship of Sir Harold Banwell on the placing and management of contracts

A report by a working party of the Economic Development Committee for Civil Engineering



The Economic Development Committees are composed of representatives of the three parties involved in industrial and economic development—management, trade unions and government. Their secretariat is provided by the National Economic Development Office, which is an independent, publicly financed body. This report was prepared for the NEDC for Civil Engineering by a working party under the chairmanship of Mr W G Harris. The NEDC authorized its publication after its meeting on 13 May, 1967.

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For convenience the chapter headings are those used in the Barwell report.

Preface

by the working party

In October 1965 the Economic Development Committee for Civil Engineering appointed us as a working party on the implementation of the report of the committee under the chairmanship of Sir Harold Barwell on *The Placing and Management of Contracts for Building and Civil Engineering Work* (HMSO 1966).

Our terms of reference were:

To consider the progress and adequacy of the measures taken or contemplated for the implementation of the Barwell committee report in so far as they relate to the civil engineering industry.

To consider any other relevant aspects of the placing and management of contracts for civil engineering.

To submit reports and recommendations on these matters to the Economic Development Committee for the Civil Engineering Industry as appropriate.

Our task has been to examine how far the appropriate Barwell recommendations have been put into effect in civil engineering and, where they are still unfulfilled, to suggest how they may best be implemented. This has taken us over a wide field in which legitimate differences of opinion existed. Where such differences have been disclosed we have not hesitated

to thrash the matter out among ourselves from first principles and to reach agreed conclusions. These conclusions have not always been strictly in accordance with the recommendations of the Barwell report or of the parallel committee appointed with similar terms of reference to ours by the EDC for Building. But these differences do not mean that we disagree with the general conclusions of the Barwell report or of the Building EDC *Action on the Barwell Report*; they arise because of the differences between building and civil engineering work and between the existing organisational structure of the civil engineering and building industries.

Our report follows the Barwell report chapter by chapter and for convenience our chapter headings are also the same. We have devoted another chapter to the subject of Contractors' claims, which was not referred to by Barwell, but which we consider to be most important, and one which we were obliged to discuss. The conclusions and recommendations represent the consensus of opinion within the working party. We were appointed as individuals and it is as individuals that we put our names to this report. We must record our debt of gratitude to our secretaries, originally Mr N P Pettinati and subsequently Mr A W Flockhart, who served us well in fact finding and not least by reducing our often complex discussions to orderly prose.

W G Harris (chairman)

N Borg

S Emm

D V Gaultier

A Goldstein

W A Fitzherbert

G W Masters

G M P Myers

A Noble

D F Rees

J C Third

C E D Wooster

A W Flockhart (secretary)